Analog Science Fact-A-fiction

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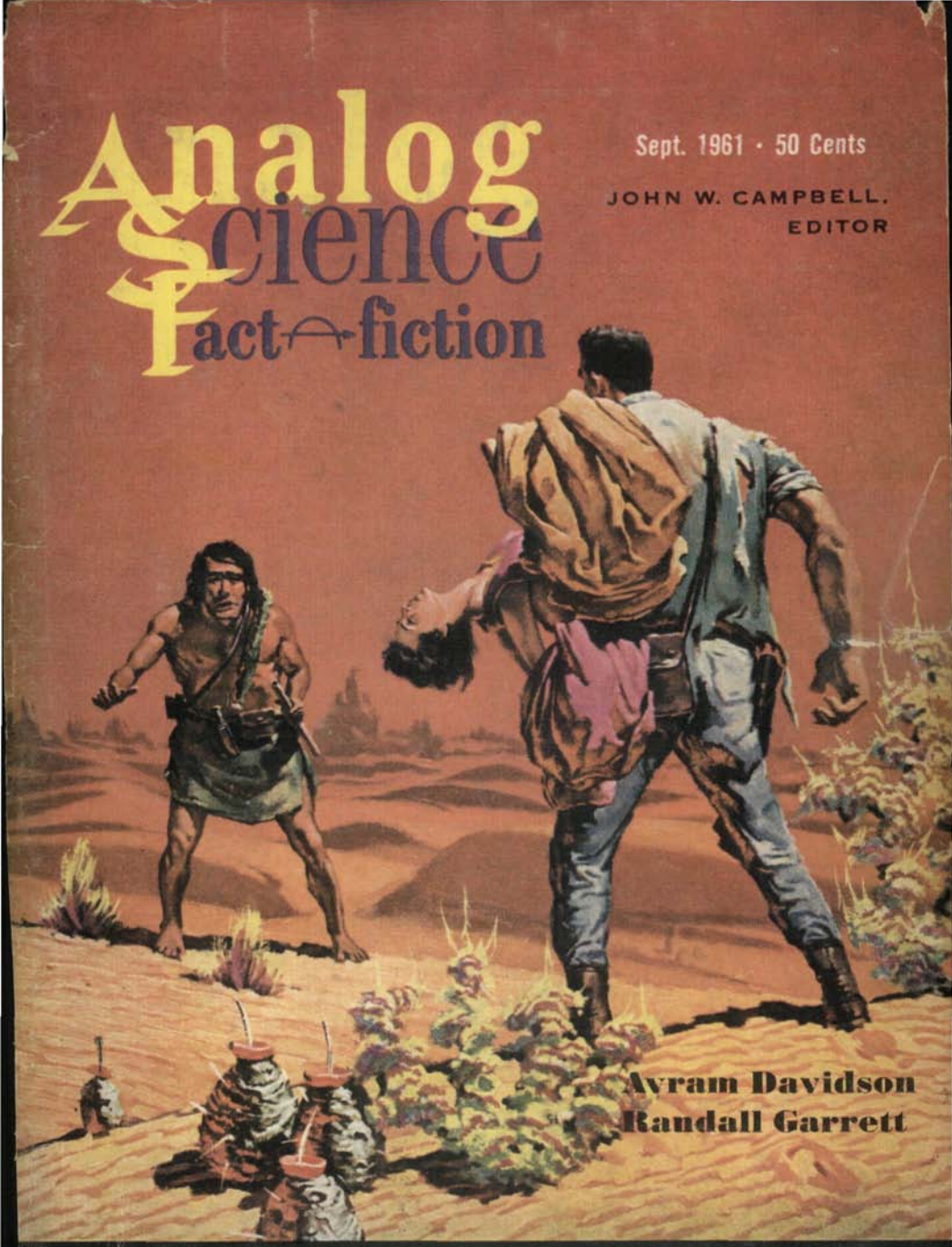

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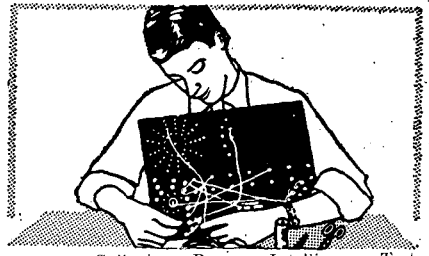

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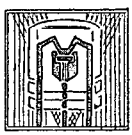
SCIENCE FANTASY



MEN have been trying to fly since—at least!—Greek times. Daedalus and Icarus, legend holds, fashioned wings of feathers and wax, and with them flew from imprisonment. Leonardo da Vinci made some efforts toward winged flight.

But the first actual flight was achieved with lighter-than-air craft—hot-air balloons, then hydrogen balloons. Toward the end of the last century, there was much discussion about passenger liners floating through the sky.

Sorry . . . wrong answer. The thing was achieved—flight, that is—by aerodynamic, rather than aerostatic principles. The passenger liners fly, but do not float, through the skies.

The essential difference between science fiction and science fantasy is that a science fantasy is based on something known to be implausible at the time the story was written. Stories of intercontinental airliners of the dirigible balloon type written in 1890 would be true science fiction; as of 1935 they were borderline science fiction. As of 1945 they were science fantasy. Experience with large lighter-than-air craft had, in the meantime, showed that while they were not impossible, they were implausible—possible, but not practical. The areodynamic stresses imposed by weather were too much for them.

Small, nonrigid craft have real use for military purposes, as patrol craft—a service in which the chief desideratum is not *getting* somewhere, but *being* somewhere.

To write, today, of great fleets of intercontinental lighter-than-air craft would be science fantasy; the time for science fiction on that theme has passed.

A lot of science-fiction themes have passed into history—or been pushed out into science fantasy—now. The more obvious ones are, of course, the stories about discovering the secret of atomic power, or about the first man into space. But a lot of

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others have, somewhat less noisily, sunk into never-never or into the already-done categories.

Notice that it wasn't the positive development of heavier-than-air craft that proved the giant lighter-than-air ships implausible; the big dirigibles proved themselves implausible, with or without assistance from airplanes. Practically every big one they built either buckled, broke, burned, or crashed. That, not the development of fast, long-range heavier-than-air ships, rendered the giant dirigible balloon science fantasy.

In a much similar way, the actual development and operation of true rocketships has, as of now, given us adequate information to recognize that any story written now, of the future based on the use of giant interplanetary rocketships is true science fantasy, and not science fiction.

The giant interplanetary rocket passenger ship will never exist.

There is, in South America, a small lizard known as the "Jesus Lizard," because it walks on water. It lives near streams and lakes; when a predator starts after it, it rises on its hind legs like a miniature dinosaur, and takes off in a violent hurry for the nearest water. It is small, light, has remarkably large flat feet, and by pickin' 'em up and layin' 'em down rapidly, is able to run on the surface of the water. The predator, naturally, can't—too big and heavy to depend on that neat little trick.

There are things that you can get away with on a small scale, that simply aren't possible on a larger scale. The Navy's patrol blimps are highly successful; their giant dirigibles were not.

The small-scale rocketships of today are marginally successful; on that general scale, they can be developed and perfected, as the modern blimps have been developed and perfected from the far less efficient early models.

But they can not grow.

That chemical-fueled rockets cannot handle the problem of useful interplanetary travel is clear already; it takes too many tons of extremely expensive hardware and fuel to get a few pounds into orbit about Earth. But an Earth-orbit position is the "ground-point" for beginning an interplanetary flight. More tons, for each pound pushed into orbit about the target planet. Then getting down to the target planet's surface again requires tons-for-pounds.

It isn't anything so neat and small as ten to one—it's a very great deal greater—but let's talk in those terms just to get the picture.

If it took only ten pounds of fuel to get one into Earth-orbit, and only ten to go from Earth-orbit to Mars-orbit, and only ten to get one from Mars-orbit to Mars, then ten to get one back from Mars to Mars-orbit, and ten to get from Mars-orbit to Earth-orbit, and if we assume a fuelless aerodynamic landing on Earth, we have the following pyramid:

For each pound landed back on Earth:	1
At Earth-orbit return	1

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At Mars-orbit	10
At Mars surface	100
At Mars-orbit going in	1000
At Earth-orbit going out.	10,000
At Earth's surface starting	100,000

This rather optimistic computation suggests at least the way the exponential pyramid expands. Assuming a fuel so cheap it costs only five cents a pound, it will cost—for fuel alone—five thousand dollars per pound of round-trip pay load.

Atomic power won't help appreciably, either. If we use nuclear energy as the energy source, we can use water as the reaction-mass—but a rocket works by ejecting mass, so you still need that super-colossal water tank to start with. Unless, of course, you use nuclear energy in some fashion that ejects the mass at far higher velocities than chemical techniques can possibly achieve.

The thrust developed by a reaction drive depends on the momentum imparted to the mass ejected—MV, the product of Mass time Velocity. Furthermore, the mass of an ejected particle can be effectively increased as the particle is accelerated to near the speed of light. But you gain nothing whatever on that deal; the mass-increase is due to energy-increase, and since mass-energy is conserved, that added mass is simply part of the mass-energy of your nuclear fuel. You're still simply throwing out your fuel-mass for reaction!

But let's hold to something reasonable—something not so high the relativistic mass-increase becomes appreciable, but high enough so that even a relatively small mass yields immense momentum. By using a sort of super ion-rocket, powered by nuclear energy, we might be able to get the required reaction-mass down from one hundred thousand pounds per pound of round-trip pay load to, say, ten to one for the round trip.

We're going to be sort of science-fantasying here to suggest we can build a small, light, compact nuclear reactor so efficient it can hold together while putting out that sort of horsepower, but for the argument let's assume we have one that's 99.9999 . . . % efficient, and so doesn't incinerate the rocketship with its own waste heat while blasting off. (One thing about chemical rockets—they carry the waste heat of their own inefficiency out the exhaust with them. A nuclear reactor wouldn't be so co-operative in that respect.)

If we get an advantage of ten thousand to one with respect to reaction mass, the exhaust velocity—by the good old MV formula—must have been increased ten thousand times. And this, of course, means that the energy in the exhaust jet has been increased 10,000 x 10,000 times—because kinetic energy goes as the *square* of the velocity—or 100,000,000 times.

You know . . . such a ship could not touch down on any major planet! It could land on an asteroid, or one of Mars' moons—but not on our Moon, any of Jupiter's or Saturn's major moons, or on any planet! Literally—it could never touch down! The

Continued on page 177

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SENSE OF OBLIGATION

By HARRY HARRISON

First of Three Parts. It took a very special type of man for the job—and the job was onerous, dangerous, and the only really probable reward was disaster. But when a man who says he knows it's going to kill him asks you to join . . .

Illustrated by van Dongen

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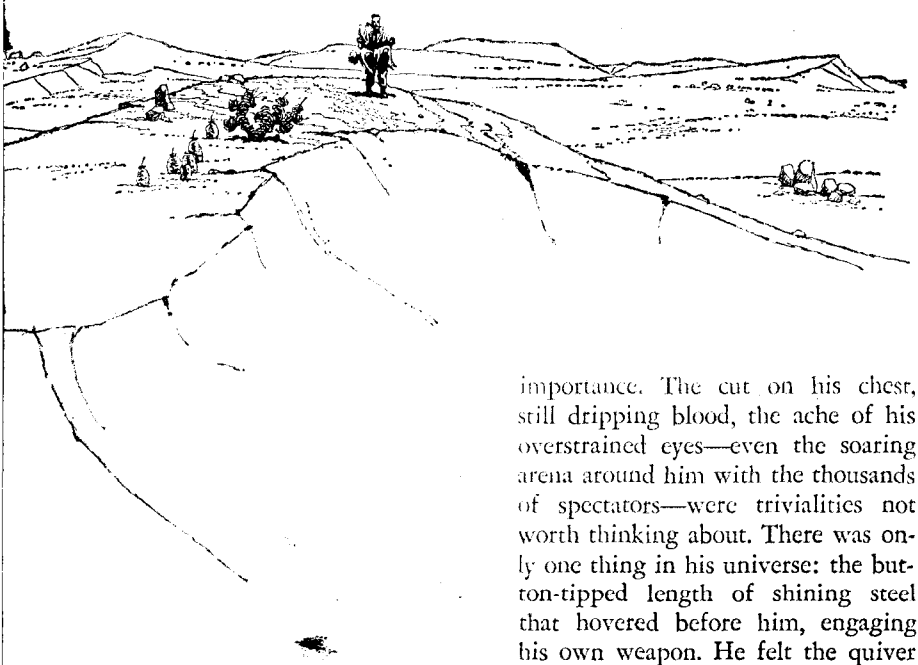

A man said to the universe:
"Sir, I exist!"
"However," replied the universe,
"The fact has not created in me
A sense of obligation."

Stephen Crane

SWEAT covered Brion's body, trickling into the tight loincloth that was the only garment he wore. The light fencing foil in his hand felt heavy as a bar of lead to his exhausted muscles, worn out by a month of continual exercise. These things were of no importance. The cut on his chest, still dripping blood, the ache of his overstrained eyes—even the soaring arena around him with the thousands of spectators—were trivialities not worth thinking about. There was only one thing in his universe: the button-tipped length of shining steel that hovered before him, engaging his own weapon. He felt the quiver and scrape of its life, knew when it moved and moved himself to counteract it. And when he attacked it was always there to beat him aside.

A sudden motion. He reacted—but his blade just met air. His instant of panic was followed by a small sharp blow high on his chest.

"Touch!" A world-shaking voice bellowed the word to a million waiting loud-speakers, and the applause of the audience echoed back in a wave of sound.

"One minute," a voice said, and the time buzzer sounded.

Brion had carefully conditioned the reflex in himself. A minute is

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not a very large measure of time and his body needed every fraction of it. The buzzer's whirr triggered his muscles into complete relaxation. Only his heart and lungs worked on at a strong, measured rate. His eyes closed and he was only distantly aware of his handlers catching him as he fell, carrying him to his bench. While they massaged his limp body and cleansed the wound, all of his attention was turned inward. He was in reverie, sliding along the borders of consciousness. The nagging memory of the previous night loomed up then, and he turned it over and over in his mind, examining it from all sides.

It was the very unexpectedness of the event that had been so unusual. The contestants in the Twenties needed undisturbed rest, therefore nights in the dormitories were quiet as death. During the first few days, of course, the rule wasn't observed too closely. The men themselves were too keyed up and excited to rest easily. But as soon as the scores begin to mount and eliminations cut into their ranks, there is complete silence after dark. Particularly so on this last night, when only two of the little cubicles were occupied, the thousands of others standing with dark, empty doors.

Angry words had dragged Brion from a deep and exhausted sleep. The words were whispered but clear, two voices, just outside the thin metal of his door. Someone spoke his name.

". . . Brion Brandd. Of course not. Whoever said you could was making a big mistake and there is going to be trouble—"

"Don't talk like an idiot!" This other voice snapped with a harsh urgency, clearly used to command. "I'm here because the matter is of utmost importance, and Brandd is the one I must see. Now stand aside!"

"The Twenties—"

"I don't give a damn about your games, hearty cheers and physical exercises. This is *important* or I wouldn't be here!"

The other didn't speak—he was surely one of the officials—and Brion could sense his outraged anger. He must have drawn his gun, because the other man said quickly, "Put that away. You're being a fool!"

"Out!" was the single snarled word of the response. There was silence then and, still wondering, Brion was once more asleep.

"Ten seconds."

The voice chopped away Brion's memories and he let awareness seep back into his body. He was unhappily conscious of his total exhaustion. The month of continuous mental and physical combat had taken its toll. It would be hard to stay on his feet, much less summon the strength and skill to fight and win a touch.

"How do we stand?" he asked the handler who was kneading his aching muscles.

"Four . . . four. All you need is a touch to win!"

"That's all he needs, too," Brion grunted, opening his eyes to look at the wiry length of the man at the

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other end of the long mat. No one who had reached the finals in the Twenties could possibly be a weak opponent, but this one, Irolg, was the pick of the lot. A red-haired, mountain of a man, with an apparently inexhaustible store of energy. That was really all that counted now. There could be little art in this last and final round of fencing. Just thrust and parry, and victory to the stronger.

Brion closed his eyes again and knew the moment he had been hoping to avoid had arrived.

Every man who entered the Twenties had his own training tricks. Brion had a few individual ones that had helped him so far. He was a moderately strong chess player, but he had moved to quick victory in the chess rounds by playing incredibly unorthodox games. This was no accident, but the result of years of work. He had a standing order with off-planet agents for archaic chess books, the older the better. He had memorized thousands of these ancient games and openings. This was allowed. Anything was allowed that didn't involve drugs or machines. Self-hypnosis was an accepted tool.

It had taken Brion over two years to find a way to tap the sources of hysterical strength. Common as the phenomenon seemed to be in the textbooks, it proved impossible to duplicate. There appeared to be an immediate association with the death-trauma, as if the two were inextricably linked into one. Berserkers and juramentados continue to fight and kill though carved by scores of mortal wounds. Men with bullets in the heart or brain fight on, though already clinically dead. Death seemed an inescapable part of this kind of strength. But there was another type that could easily be brought about in any deep trance—hypnotic rigidity. The strength that enables someone in a trance to hold his body stiff and unsupported except at two points, the head and heels. This is physically impossible when conscious. Working with this as a clue, Brion had developed a self-hypnotic technique that allowed him to tap these reservoirs of unknown strength. The source of "second wind," the survival strength that made the difference between life and death.

It could also kill. Exhaust the body beyond hope of recovery, particularly when in a weakened condition as his was now. But that wasn't important. Others had died before during the Twenties, and death during the last round was in some ways easier than defeat.

Breathing deeply, Brion softly spoke the auto-hypnotic phrases that triggered the process. Fatigue fell softly from him, as did all sensations of heat, cold and pain. He could feel with acute sensitivity, hear, and see clearly when he opened his eyes.

With each passing second the power drew at the basic reserves of life, draining it from his body.

When the buzzer sounded he pulled his foil from his second's

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startled grasp, and ran forward. Irolg had barely time to grab up his own weapon and parry Brion's first thrust. The force of his rush was so great that the guards on their weapons locked, and their bodies crashed together. Irolg looked amazed at the sudden fury of the attack—then smiled. He thought it was a last burst of energy, he knew how close they both were to exhaustion. This must be the end for Brion.

They disengaged and Irolg put up a solid defense. He didn't attempt to attack, just let Brion wear himself out against the firm shield of his defense.

Brion saw something close to panic on his opponent's face when the man finally recognized his error. Brion wasn't tiring. If anything he was pressing the attack. A wave of despair rolled out from Irolg—Brion sensed it and knew the fifth point was his.

Thrust—thrust—and each time the parrying sword a little slower to return. Then the powerful twist that thrust it aside. In and under the guard. The slap of the button on flesh and the arc of steel that reached out and ended on Irolg's chest over his heart.

Waves of sound—cheering and screaming—lapped against Brion's private world, but he was only remotely aware of their existence. Irolg dropped his foil, and tried to shake Brion's hand, but his legs suddenly gave way. Brion had an arm around him, holding him up, walking towards the rushing handlers. Then Irolg was gone and he waved off his own men, walking slowly by himself.

Except something was wrong and it was like walking through warm glue. Walking on his knees. No, not walking, falling. At last. He was able to let go and fall.

II

Ihjel gave the doctors exactly one day before he went to the hospital. Brion wasn't dead, though there had been some doubt about that the night before. Now, a full day later, he was on the mend and that was all Ihjel wanted to know. He bullied and strong-armed his way to the new Winner's room, meeting his first stiff resistance at the door.

"You're out of order, Winner Ihjel," the doctor said. "And if you keep on forcing yourself in here, where you are not wanted, rank or no rank I shall be obliged to break your head."

Ihjel had just begun to tell him, in some detail, just how slim his chances were of accomplishing that, when Brion interrupted them both. He recognized the newcomer's voice from the final night in the barracks.

"Let him in, Dr. Caulry," he said. "I want to meet a man who thinks there is something more important than the Twenties."

While the doctor stood undecided, Ihjel moved quickly around him and closed the door in his flushed face. He looked down at the Winner in the bed. There was a drip plugged into each one of Brion's arms. His

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eyes peered from sooty hollows; the eyeballs were a network of red veins. The silent battle he fought against death had left its mark. His square, jutting jaw now seemed all bone, as did his long nose and high cheekbones. They were prominent landmarks rising from the limp grayness of his skin. Only the erect bristle of his close-cropped hair was unchanged. He had the appearance of having suffered a long and wasting illness.

"You look like sin," Ihjel said. "But congratulations on your victory."

"You don't look so very good yourself—for a Winner," Brion snapped back. His exhaustion and sudden peevish anger at this man let the insulting words slip out. Ihjel ignored them.

But it was true, Winner Ihjel looked very little like a Winner, or even an Anvharian. He had the height and the frame all right, but it was draped in billows of fat. Rounded, soft tissue that hung loosely from his limbs and made little limp rolls on his neck and under his eyes. There were no fat men on Anvhar and it was incredible that a man so gross could ever have been a Winner. If there was muscle under the fat, it couldn't be seen. Only his eyes appeared to still hold the strength that had once bested every man on the planet to win the annual games. Brion turned away from their burning stare, sorry now he had insulted the man without good reason. He was too sick though to bother about apologizing.

Ihjel didn't care either. Brion looked at him again and felt the impression of things so important that himself, his insults, even the Twenties were of no more interest than dust motes in the air. It was only a fantasy of sick mind, Brion knew, and he tried to shake the feeling off. The two men stared at each other, sharing a common emotion.

The door opened soundlessly behind Ihjel and he wheeled about, moving as only an athlete of Anvhar can move. Dr. Caulry was halfway through the door, off balance. Two more men in uniform came close behind him. Ihjel's body pushed against them, his speed and the mountainous mass of his flesh sending them back in a tangle of arms and legs. He slammed the door and locked it in their faces.

"I have to talk to you," he said, turning back to Brion. "Privately," he added, bending over and ripping out the communicator with a sweep of one hand.

"Get out," Brion told him. "If I were able—"

"Well you're not, so you're just going to have to lie there and listen. I imagine we have about five minutes before they decide to break the door down, and I don't want to waste any more of that. Will you come with me offworld? There's a job that must be done, it's my job but I'm going to need help. You're the only one who can give me that help.

"Now refuse," he added as Brion started to answer.

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"Of course I refuse," Brion said, feeling a little foolish and slightly angry, as if the other man had put the words into his mouth. "Anvhar is my planet—why should I leave? My life is here and so is my work. I also might add that I have just won the Twenties, I have a responsibility to remain."

"Nonsense. I'm a Winner and I left. What you really mean is you would like to enjoy a little of the ego-inflation you have worked so hard to get. Off Anvhar no one even knows what a Winner is—much less respects one. You will have to face a big universe out there and I don't blame you for being a little frightened."

Someone was hammering loudly on the door.

"I haven't the strength to get angry," Brion said hoarsely. "And I can't bring myself to admire your ideas when they permit you to insult a man too ill to defend himself."

"I apologize," Ihjel said, with no hint of apology or sympathy in his voice. "But there are more desperate issues involved other than your hurt feelings. We don't have much time now, so I want to impress you with an idea."

"An idea that will convince me to go offplanet with you? That's expecting a lot."

"No, this idea won't convince you—but thinking about it will. If you really *consider* it you will find a lot of your illusions shattered. Like everyone else on Anvhar you're a Scientific Humanist with your faith firmly planted in the Twenties. You accept both of these noble institutions without an instant's thought. All of you haven't a single thought for the past, for the untold billions who led the bad life as mankind slowly built up the good life for you to lead. Do you ever think of all the people who suffered and died in misery and superstition while civilization was clicking forward one more slow notch?"

"Of course I don't think about them," Brion snapped back. "Why should I? I can't change the past."

"But you can change the future!" Ihjel said. "You owe something to the suffering ancestors who got you where you are today. If Scientific Humanism means anything more than plain words to you, you must possess a sense of responsibility. Don't you want to try and pay off a bit of this debt by helping others who are just as backward and disease ridden today as great-grandfather Troglodyte ever was?"

The hammering on the door was louder, this and the drug-induced buzzing in Brion's ears made thinking difficult. "Abstractedly I, of course, agree with you," he said haltingly. "But you know there is nothing I can do personally without being emotionally involved. A logical decision is valueless for action without personal meaning."

"Then we have reached the crux of the matter," Ihjel said gently. His back was braced against the door, absorbing the thudding blows of some heavy object on the outside. "They're

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knocking, so I must be going soon. I have no time for details, but I can assure you, upon my word of honor as a Winner, that there is something you can do. Only you. If you help me, we might save seven million human lives. That is a fact . . ."

The lock burst and the door started to open. Ihjel shouldered it back into the frame for a final instant.

". . . Here is the idea I want you to consider: Why is it that the people of Anvhar in a galaxy filled with warring, hate-filled, backward planets, should be the only ones who base their entire existence on a complicated series of games?"

III

This time there was no way to hold the door. Ihjel didn't try. He stepped aside and two men stumbled into the room. He walked out behind their backs without saying a word.

"What happened? What did he do?" the doctor asked, rushing in through the ruined door. He swept a glance over the continuous recording dials at the foot of Brion's bed. Respiration, temperature, heart, blood pressure—all were normal. The patient lay quietly and didn't answer him.

For the rest of that day, Brion had much to think about. It was difficult. The fatigue, mixed with the tranquilizers and other drugs had softened his contact with reality. His thoughts kept echoing back and forth in his mind, unable to escape. What had Ihjel meant? What was that nonsense about Anvhar? Anvhar was that way because . . . well it just was. It had come about naturally. Or had it? The planet had a very simple history.

From the very beginning there had never been anything of real commercial interest on Anvhar. Well off the interstellar trade routes, there were no minerals worth digging and transporting the immense distances to the nearest inhabited worlds. Hunting the winter beasts for their pelts was a profitable but very minor enterprise, never sufficient for mass markets. Therefore no organized attempt had ever been made to colonize the planet. In the end it had been settled completely by chance. A number of offplanet scientific groups had established observation and research stations, finding unlimited data to observe and record during Anvhar's unusual yearly cycle. The long-duration observations encouraged the scientific workers to bring their families and, slowly but steadily, small settlements grew up. Many of the fur hunters settled there as well, adding to the small population. This had been the beginning.

Few records existed of those early days, and the first six centuries of Anvharian history were more speculation than fact. The Breakdown occurred about that time and in the galaxy-wide disruption, Anvhar had to fight its own internal battle. When the Earth Empire collapsed it was the end of more than an era. Many of the observation stations found themselves representing institutions

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that no longer existed. The professional hunters no longer had markets for their furs, since Anvhar possessed no interstellar ships of its own. There had been no real physical hardship involved in the Breakdown, as it affected Anvhar, since the planet was completely self sufficient. Once they had made the mental adjustment to the fact that they were now a sovereign world, not a collection of casual visitors with various loyalties, life continued unchanged. Not easy—living on Anvhar is never easy—but at least without difference on the surface.

The thoughts and attitudes of the people were however going through a great transformation. Many attempts were made to develop some form of stable society and social relationship. Again little record exists of these early trials, other than the fact of their culmination in the Twenties.

To understand the Twenties, you have to understand the unusual orbit that Anvhar tracks around its sun, 70 Ophiuchi. There are other planets in this system, all of them more or less conforming to the plane of the ecliptic. Anvhar is obviously a rogue, perhaps a captured planet of another sun. For the greatest part of its 780-day year it arcs far out from its primary, in a high-angled sweeping cometary orbit. When it returns there is a brief, hot summer of approximately eighty days before the long winter sets in once more. This severe difference in seasonal change has

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caused profound adaptations in the native life forms. During the winter most of the animals hibernate, the vegetable life lying dormant as spores or seeds. Some of the warm-blooded herbivores stay active in the snow-covered tropics, preyed upon by fur-insulated carnivores. Though unbelievably cold, the winter is a season of peace in comparison to the summer.

This is a time of mad growth. Plants burst into life with a strength that cracks rocks, growing fast enough for the motion to be seen. The snow fields melt into mud and within days a jungle stretches high into the air. Everything grows, swells, proliferates. Plants climb on top of plants, fighting for the life-energy of the sun. Everything is eat and be eaten, grow and thrive in that short season. Because when the first snow of winter falls again, ninety per cent of the year must pass until the next coming of warmth.

Mankind has had to adapt to the Anvharian cycle in order to stay alive. Food must be gathered and stored, enough to last out the long winter. Generation after generation had adapted until they look on the mad seasonal imbalance as something quite ordinary. The first thaw of almost-nonexistent spring triggers a wide reaching metabolic change in the humans. Layers of subcutaneous fat vanish and half-dormant sweat glands come to life. Other changes are more subtle than the temperature adjustment, but equally important. The sleep center of the brain is depressed. Short naps or a night's rest every third or fourth day become enough. Life takes on a hectic and hysterical quality that is perfectly suited to the environment. By the time of the first frost, rapid growing crops have been raised and harvested, sides of meat either preserved or frozen in mammoth lockers. With his supreme talent of adaptability mankind has become part of the ecology and guaranteed his own survival during the long winter.

Physical survival has been guaranteed. But what about mental survival? Primitive Earth Eskimos can fall into a long doze of half-conscious hibernation. Civilized men might be able to do this, but only for the few cold months of terrestrial mid-winter. It would be impossible to do during a winter that is longer than an Earth year. With all the physical needs taken care of, boredom became the enemy of any Anvharian who was not a hunter. And even the hunters could not stay out on solitary trek all winter. Drink was one answer and violence another. Alcoholism and murder were the twin terrors of the cold season, after the Breakdown.

It was the Twenties that ended all that. When they became a part of normal life the summer was considered just an interlude between games. The Twenties were more than just a contest—they became a way of life that satisfied all the physical, competitive and intellectual needs of this unusual planet. They were a decathlon—rather a doubled decathlon—

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raised to its highest power, where contests in chess and poetry composition held equal place with those in ski-jumping and archery. Each year there were two planet-wide contests held, one for men and one for women. This was not an attempt at sexual discrimination, but a logical facing of facts. Inherent differences prevented fair contests—for example, it is impossible for a woman to win a large chess tournament—and this fact was recognized. Anyone could enter for any number of years, there were no scoring handicaps.

When the best man won he was really the best man. A complicated series of playoffs and eliminations kept contestants and observers busy for half the winter. They were only preliminary to the final encounter that lasted a month, and picked a single winner. That was the title he was awarded. Winner. The man—and woman—who had bested every other contestant on the entire planet and who would remain unchallenged until the following year.

Winner. It was a title to take pride in. Brion stirred weakly on his bed and managed to turn so he could look out of the window. Winner of Anvhar. His name was already slated for the history books, one of the handful of planetary heroes. School children would be studying *him* now, just as he had read of the Winners of the past. Weaving daydreams and imaginary adventures around Brion's victories, hoping and fighting to some day equal them. To be a Winner was the greatest honor in the universe.

Outside, the afternoon sun shimmered weakly in a dark sky. The endless icefields soaked up the dim light, reflecting it back as a colder and harsher illumination. A single figure on skis cut a line across the empty plain; nothing else moved. The depression of the ultimate fatigue fell on Brion and everything changed, as if he looked in a mirror at a previously hidden side.

He saw suddenly—with terrible clarity—that to be a Winner was to be absolutely nothing. Like being the best flea, among all the fleas on a single dog.

What was Anvhar after all? An ice-locked planet, inhabited by a few million human fleas, unknown and unconsidered by the rest of the galaxy. There was nothing here worth fighting for, the wars after the Breakdown had left them untouched. The Anvharians had always taken pride in this—as if being so unimportant that no one else even wanted to come near you, could possibly be a source of pride. All the worlds of man grew, fought, won, lost, changed. Only on Anvhar did life repeat its sameness endlessly, like a loop of tape in a player . . .

Brion's eyes were moist, he blinked. *Tears!!* Realization of this incredible fact wiped the maudlin pity from his mind and replaced it with fear. Had his mind snapped in the strain of the last match? These thoughts weren't his. Self-pity hadn't made him a Winner—why was he feeling

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it now? Anvhar was his universe—how could he even imagine it as a tag-end planet at the outer limb of creation? What had come over him and induced this inverse thinking.

As he thought the question, the answer appeared at the same instant. Winner Ihjel. The fat man with the strange pronouncements and probing questions. Had he cast a spell like some sorcerer—or the devil in "Faust"? No, that was pure nonsense. But he had done something. Perhaps planted a suggestion when Brion's resistance was low. Or used subliminal vocalization like the villain in "Cerebrus Chained." Brion could find no adequate reason on which to base his suspicions. But he knew that Ihjel was responsible.

He whistled at the sound-switch next to his pillow and the repaired communicator came to life. The duty nurse appeared in the small screen.

"The man who was here today," Brion said, "Winner Ihjel, do you know where he is? I must contact him."

For some reason this flustered her professional calm. The nurse started to answer, excused herself, and blanked the screen. When it lit again a man in Guard's uniform had taken her place.

"You made an inquiry," the Guard said, "about Winner Ihjel. We are holding him here in the hospital, following the disgraceful way in which he broke into your room."

"I have no charges to make. Will you ask him to come and see me at once?"

The Guard controlled his shock. "I'm sorry, Winner—I don't see how we can. Dr. Caulry left specific orders that you were not to be—"

"The doctor has no control over my personal life," Brion snapped at him. "I'm not infectious, or ill with anything more than extreme fatigue. I want to see that man. At once."

The Guard took a deep breath, and made a quick decision. "He is on the way up now," he said, and rung off.

"What did you do to me?" Brion asked as soon as Ihjel had enter and they were alone. "You won't deny that you have put alien thoughts in my head?"

"No, I won't deny it. Because the whole point of my being here is to get those 'alien' thoughts across to you."

"Tell me how you did it," Brion insisted. "I must know."

"I'll tell you—but there are many things you should understand first, before you decide to leave Anvhar. You must not only hear them, you will have to believe them. The primary thing, the clue to the rest, is the true nature of your life here. How do you think the Twenties originated?"

Brion carefully took a double dose of the mild stimulant he was allowed, before he answered. "I don't think," he said, "I know. It's a matter of historical record. The founder of the games was Giroldi, the first contest was held in 378 A.B. The Twenties have been held every year

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since then. They were strictly local affairs in the beginning, but were soon well established on a planet-wide scale."

"True enough," Ihjel said, "but you're describing *what* happened. I asked you *how* the Twenties originated. How could any single man take a barbarian planet, lightly inhabited by half-mad hunters and alcoholic farmers, and turn it into a smooth-running social machine built around the artificial structure of the Twenties? It just can't be done."

"But it was done!" Brion insisted. "You can't deny that. And there is nothing artificial about the Twenties. They are a logical way to live a life on a planet like this."

Ihjel had to laugh, a short ironic bark. "Very logical," he said, "but how often does logic have anything to do with the organization of social groups and governments? You're not thinking. Put yourself in founder Giroldi's place. Imagine that you have glimpsed the great idea of the Twenties and you want to convince others. So you walk up to the nearest louse-ridden, brawling, superstitious, booze-embalmed hunter and explain clearly. How a program of his favorite sports—things like poetry, archery and chess—can make his life that much more interesting and virtuous. You do that. But keep your eyes open and be ready for a fast draw."

Even Brion had to smile at the absurdity of the suggestion. Of course it couldn't happen that way. Yet, since it had happened, there must be a simple explanation.

"We can beat this back and forth all day," Ihjel told him, "and you won't get the right idea unless—" He broke off suddenly, staring at the communicator. The operation light had come on, though the screen stayed dark. Ihjel reached down a meaty hand and pulled loose the recently connected wires. "That doctor of yours is very curious—and he's going to stay that way. The truth behind the Twenties is none of his business. But it's going to be yours. You must come to realize that the life you lead here is a complete and artificial construction, developed by Societics experts and put into application by skilled field workers."

"Nonsense!" Brion broke in. "Systems of society can't be dreamed up and forced on people like that. Not without bloodshed and violence."

"Nonsense, yourself," Ihjel told him. "That may have been true in the dawn of history, but not any more. You have been reading too many of the old Earth classics, you imagine that we still live in the Ages of Superstition. Just because Fascism and Communism were once forced on reluctant populations, you think this holds true for all time. Go back to your books. In exactly the same era democrary and self-government were adapted by former colonial states, like India and the Union of North Africa, and the only violence was between local religious groups. Change is the lifeblood of mankind. Everything we today accept as normal was at one time an

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innovation. And one of the most recent innovations is the attempt to guide the societies of mankind into something more consistent with the personal happiness of individuals."

"The God complex," Brion said, "forcing human lives into a mold whether they want to be fitted into it or not."

"Societies can be that," Ihjel agreed. "It was in the beginning, and there were some disastrous results of attempts to force populations into a political climate where they didn't belong. They weren't all failures—Anvhar here is a striking example of how good the technique can be when correctly applied. It's not done this way anymore, though. Like all of the other sciences, we have found out that the more we know, the more there is to know. We no longer attempt to guide cultures towards what we consider a beneficial goal. There are too many goals, and from our limited vantage point it is hard to tell the good ones from the bad ones. All we do now is try to protect the growing cultures, give a little jolt to the stagnating ones—and bury the dead ones. When the work was first done here on Anvhar the theory hadn't progressed that far. The understandably complex equations that determine just where in the scale from a Type I to a Type V a culture is, had not yet been completed. The technique then was to work out an artificial culture that would be most beneficial for a planet, then bend it into the mold."

"But how?" Brion asked.

"We've made some progress—you're finally asking 'how'. The technique here took a good number of agents, and a great deal of money. Personal honor was emphasized in order to encourage dueling, this led to a heightened interest in the technique of personal combat. When this was well intrenched Giroldi was brought in, and he showed how organized competitions could be more interesting than haphazard encounters. Tying the intellectual aspects onto the framework of competitive sports was a little more difficult, but not overwhelmingly so. The details aren't important, all we are considering now is the end product. Which is you. You're needed very much."

"Why me?" Brion asked. "Why am I special? Because I won the Twenties? I can't believe that. Taken objectively there isn't that much difference between myself and the ten runners-up. Why don't you ask one of them—they could do your job as well as I."

"No they couldn't. I'll tell you later why you are the only man I can use. Our time is running out and I must convince you of some other things first." Ihjel glanced at his watch. "We have less than three hours to dead-deadline. Before that time I must explain enough of our work to you to enable you to decide voluntarily to join us."

"A very tall order," Brion said. "You might begin by telling me just who this mysterious 'we' is that you keep referring to."

"The Cultural Relationships Foun-

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dation. A nongovernmental body, privately endowed, existing to promote peace and ensure the sovereign welfare of independent plants, so that all will prosper from the good will and commerce thereby engendered."

"Sounds like you're quoting," Brion told him. "No one could possibly make up something that sounds like that on the spur of the moment."

"I was quoting, from our charter of organization. Which is all very fine in a general sense, but I'm talking specifically now. About you. You are the product of a tightly knit and very advanced society. Your individuality has been encouraged by your growing up in a society so small in population that only a mild form of government control is necessary. The normal Anvharian education is an excellent one, and participation in the Twenties has given you a general and advanced education second to none in the galaxy. It would be a complete waste of your entire life if you now took all this training and wasted it on some rustic farm."

"You give me very little credit. I plan to teach—"

"Forget Anvhar!" Ihjel cut him off with a chop of his hand. "This world will roll on quite successfully whether you are here or not. You must forget it, think of its relative unimportance on a galactic scale, and consider instead the existing, suffering hordes of mankind. You must think what you can do to help them."

"But what can I do—as an individual? The day is long past when a single man, like Caesar or Alexander, could bring about world-shaking changes."

"True—but not true," Ihjel said. "There are key men in every conflict of forces, men who act like catalysts applied at the right instant to start a chemical reaction. You might be one of these men, but I must be honest and say that I can't prove it yet. So in order to save time and endless discussion, I think I will have to spark your personal sense of obligation."

"Obligation to whom?"

"To mankind of course, to the countless billions of dead who kept the whole machine rolling along that allows you the full, long and happy life you enjoy today. What they gave to you, you must pass on to others. This is the keystone of humanistic morals."

"Agreed. And a very good argument in the long run. But not one that is going to tempt me out of this bed within the next three hours."

"A point of success," Ihjel said. "You agree with the general argument. Now I apply it specifically to you. Here is the statement I intend to prove. There exists a planet with a population of seven million people. Unless I can prevent it, this planet will be completely destroyed. It is my job to stop that destruction, so that is where I am going now. I won't be able to do the job alone. In addition to others I need you. Not anvone like you—but you and you alone."

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"You have precious little time left to convince me of all that," Brion told him, "so let me make the job easier for you. The work you do, this planet, the imminent danger of the people there—these are all facts that you can undoubtedly supply. I'll take a chance that this whole thing is not a collossal bluff and admit that given time, you could verify them all. This brings the argument back to me again. How can you possibly prove that I am the only person in the galaxy who can help you?"

"I can prove it by your singular ability, the thing I came here to find."

"What ability? I am different in no way from the other men on my planet."

"You're wrong," Ihjel said. "You are the embodied proof of evolution. Rare individuals with specific talents occur constantly in any specie, man included. It has been two generations since an empathetic was last born on Anvhar and I have been watching carefully most of that time."

"What in blazes is an empathetic —and how you recognize it when you have found it?" Brion chuckled, this talk was getting preposterous.

"I can recognize one because I'm one myself—there is no other way. As to how projective empathy works, you had a demonstration of that a little earlier, when you felt those strange thoughts about Anvhar. It will be a long time before you can master that, but receptive empathy is your natural trait. This is mentally entering into the feeling, or what could be called the spirit of another person. Empathy is not thought perception, it might better be described as the sensing of someone else's emotional makeup, feelings and attitudes. You can't lie to a trained empathetic because he can sense the real attitude behind the verbal lies. Even your undeveloped talent has proved immensely useful in the Twenties. You can outguess your opponent because you know his movements even as his body tenses to make them. You accept this without ever questioning it."

"How do you know—?" This was Brion's understood, but never voiced secret.

Ihjel smiled. "Just guessing. But I won the Twenties too, remember, also without knowing a thing about empathy at the time. On top of our normal training, it's a wonderful trait to have. Which brings me to the proof we mentioned a minute ago. When you said you would be convinced if I could prove you were the only person who could help me. I *believe* you are—and that is one thing I cannot lie about. It's possible to lie about a belief verbally, to have a falsely based belief, or to change a belief. But you can't lie about it to yourself.

"Equally important—you can't lie about a belief to an empathetic. Would you like to see how I feel about this? 'See' is a bad word—there is no vocabulary for this kind of thing yet. Better, would you join me in my feelings? Seense my attitudes, memories and emotions just as I do?"

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Brion tried to protest, but he was too late. The doors of his senses were pushed wide and he was overwhelmed.

"Dis . ." Ihjel said aloud. "Seven million people . . . hydrogen bombs . . . Brion Brandd." These were just key words, land marks of association. With each one Brion felt the rushing wave of the other man's emotions.

There could be no lies here, Ihjel was right in that. This was the raw stuff that feelings are made of, the basic reactions to the things and symbols of memory.

DIS . . . DIS . . . DIS . . . it was a word it was a planet and the word thundered like a drum a drum the sound of its thunder surrounded and was

a wasteland a planet
of death a planet where
living was dying and
dying was very
better than
living
crude barbaric
backward miserable
dirty beneath
consideration
planet

DIS

hot burning scorching
wasteland of sands
and sands and sands and
sands that burned had burned
will burn forever

the people of this planet so
crude dirty miserable barbaric
subhuman in-human less-than-human
but
they
were
going
to
be
DEAD
and DEAD they would be seven million blackened corpses that
would blacken your dreams
all dreams dreams
forever because those
HYDROGEN BOMBS
were waiting
to kill
them unless . . unless . . unless . . you Ihjel stopped it you Ihjel (DEATH) you (DEATH)
you (DEATH) alone couldn't do
it you (DEATH)
must have
BRION BRANDD wet-behind-the-ears-raw-untrained-Brion-Brand-to help-you he was the only one in the galaxy who could finish the job . . .

As the flow of sensation died away, Brion realized he was sprawled back weakly on his pillows, soaked with sweat, washed with the memory of the raw emotion. Across from him Ihjel sat with his face bowed into his hands. When he lifted his head Brion saw within his eyes a shadow of the blackness he has just experienced.

"Death," Brion said. "That terrible feeling of death. It wasn't just the people of Dis who would die. It was something more personal."

"Myself," Ihjel said, and behind

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this simple word were the repeated echoes of night that Brion had been made aware of with his newly recognized ability. "My own death, not too far away. This is the wonderfully terrible price you must pay for your talent. *Angst* is an inescapable part of empathy. It is a part of the whole unknown field of psi phenomena that seems to be independent of time. Death is so traumatic and final that it reverberates back along the time line. The closer I get, the more aware of it I am. There is no exact feeling of date, just a rough location in time. That is the horror of it. I *know* I will die soon after I get to Dis—and long before the work there is finished. I know the job to be done there, and I know the men who have already failed at it. I also know you are the only person who can possibly complete the work I have started. Do you agree now? Will you come with me?"

"Yes, of course," Brion said. "I'll go with you."

IV

"I've never seen anyone quite as angry as that doctor," Brion said.

"Can't blame him," Ihjel shifted his immense weight and grunted from the console, where he was having a coded conversation with the ship's brain. He hit the keys quickly, and read the answer from the screen. "You took away his medical moment of glory. How many times in his life will he have a chance to nurse back to rugged smiling health the triumphantly exhausted Winner of the Twenties?"

"Not many, I imagine. The wonder of it is how you managed to convince him that you and the ship here could take care of me as well as his hospital."

"I could never convince him of that," Ihjel said. "But I and the Cultural Relationships Foundation have some powerful friends on Anvhar. I'm forced to admit I brought a little pressure to bear." He leaned back and read the course tape as it streamed out of the printer. "We have a little time to spare, but I would rather spend it waiting at the other end. We'll blast as soon as I have you tied down in a statis field."

The completeness of the stasis field leaves no impression on the body or mind. In it there is no weight, no pressure, no pain—no sensation of any kind. Except for a stasis of very long duration, there is no sensation of time. To Brion's consciousness, Ihjel flipped the switch off with a continuation of the same motion that had turned it on. The ship was unchanged, only outside of the port was the red-shot blankness of jump space.

"How do you feel?" Ihjel asked.

Apparently the ship was wondering the same thing. It's detector unit, hovering impatiently just outside of Brion's stasis field, darted down and settled on his bare forearm. The doctor back on Anvhar had given the medical section of the ship's brain a complete briefing. A quick check of a dozen factors of Brion's metabolism

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was compared to the expected norm. Apparently everything was going well, because the only reaction was the expected injection of vitamins and glucose.

"Can't say I'm feeling wonderful yet," Brion answered, levering himself higher on the pillows. "But every day it's a bit better, steady progress."

"I hope so, because we have about two weeks before we get to Dis. Think you'll be back in shape by that time?"

"No promises," Brion said, giving a tentative squeeze to one bicep. "It should be enough time, though. Tomorrow I start mild exercise and that will tighten me up again. Now —tell me more about Dis and what you have to do there."

"I'm not going to do it twice, so just save your curiosity a while. We're heading for a rendezvous-point now to pick up another operator. This is going to be a three-man team, you, me and an exobiologist. As soon as he is aboard I'll do a complete briefing for you both at the same time. What you can do now is get your head into the language box and start working on your Disan. You'll want to speak it perfectly by the time we touch down."

With an autohypno for complete recall, Brion had no difficulty in mastering the grammar and vocabulary of Disan. Pronunciation was a different matter altogether. Almost all the word endings were swallowed, muffled or gargled. The language was rich in glottal stops, clicks and guttural strangling sounds. Ihjel stayed in a different part of the ship, when Brion used the voice mirror and analysis scope, claiming that the awful noises interfered with his digestion.

Their ship angled through jump-space along its calculated course. It kept its fragile human cargo warm, fed them and supplied breathable air. It had orders to worry about Brion's health, so it did, checking constantly against its recorded instructions and noting his steady progress. Another part of the ship's brain counted microseconds with moronic fixation, finally closing a relay when a predetermined number had expired in its heart. A light flashed and a buzzer hummed gently but insistently.

Ihjel yawned, put away the report he had been reading, and started for the control room. He shuddered when he passed the room where Brion was listening to a playback of his Disan efforts.

"Turn off that dying brontosaurus and get strapped in," he called through the thin door. "We're coming to the point of optimum possibility and we'll be dropping back into normal space soon."

The human mind can ponder the incredible distances between the stars, but cannot possibly contain within itself a real understanding of them. Marked out on a man's hand an inch is a large unit of measure. In interstellar space a cubical area with sides a hundred-thousand miles long is a microscopically fine division.

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Light crosses this distance in a fraction of a second. To a ship moving with a relative speed far greater than that of light, this measuring unit is even smaller. Theoretically it appears impossible to find a particular area of this size. Technologically it was a repeatable miracle that occurred too often to even be interesting.

Brion and Ihjel were strapped in when the jump-drive cut off abruptly, lurching them back into normal space and time. They didn't unstrap, just sat and looked at the dimly distant pattern of stars. A single sun, of apparent fifth magnitude was their only neighbor in this lost corner of the universe. They waited while the computer took enough star sights to triangulate a position in three dimensions, muttering to itself electronically while it did the countless calculations to find their position. A warning bell chimed and the drive cut on and off so quickly the two acts seemed simultaneous. This happened again, twice, before the brain was satisfied it had made as good a fix as possible and flashed a NAVIGATION POWER OFF light. Ihjel unstrapped, stretched and made them a meal.

Ihjel had computed their passage time with criminally precise allowances. Less than ten hours after they arrived a powerful signal blasted into their waiting receiver. They strapped in again as the NAVIGATION POWER ON signal blinked insistently.

A ship had paused in flight somewhere relatively near in the vast volume of space. It had entered normal space just long enough to emit a signal of radio query on an assigned wave length. Ihjel's ship had detected this and instantly responded with a verifying signal. The passenger spacer had accepted this assurance and gracefully laid a ten-foot metal egg in space. As soon as this had cleared its jump field the parent ship vanished towards its destination, light-years away.

Ihjel's ship climbed up the signal it had received. This signal had been recorded and examined minutely. Angle, strength and Doppler movement were computed to find course and distance. A few minutes of flight were enough to get within range of the far weaker transmitter in the dropcapsule. Homing on this signal was so simple, a human pilot could have done it himself. The shining sphere loomed up, then vanished out of sight of the viewports as the ship rotated to bring the space lock into line. Magnetic clamps cut in when they made contact.

"Go down and let the bug-doctor in," Ihjel said. "I'll stay and monitor the board in case of trouble."

"What do I have to do?"

"Get into a suit and open the outer lock. Most of the drop sphere is made of inflatable metallic foil so don't bother to look for the entrance. Just cut a hole in it with the oversize can opener you'll find in the tool box. After Dr. Morees gets aboard jettison the thing. Only get the radio and locator unit out first—it gets used again."

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The tool did look like a giant opener. Brion carefully felt the resiliant metal skin that covered the lock entrance, until he was sure there was nothing on the other side. Then he jabbed the point through and cut a ragged hole in the thin foil. Dr. Morees boiled out of the sphere, knocking Brion aside

"What's the matter?" Brion asked.

There was no radio on the other's suit, he couldn't answer. But he did shake his fist angrily. The helmet ports were opaqued so there was no way to tell what expression went with the gesture. Brion shrugged and turned back to salvaging the equipment pack, pushing the punctured balloon free and sealing the lock. When pressure was pumped back to ship-normal he cracked his helmet and motioned the other to do the same.

"You're a pack of dirty lying dogs!" Dr. Morees said when the helmet came off. Brion was completely baffled. Dr. Lea Morees had long dark hair, large eyes and a delicately shaped mouth now taut with anger. Dr. Morees was a woman.

"Are you the filthy swine responsible for this atrocity?" Lea asked menacingly.

"In the control room," Brion said quickly, knowing when cowardice was much preferable to valor. "A man named Ihjel. There's a lot of him to hate, you can have a good time doing it. I just joined up myself —" He was talking to her back as she stormed from the room. Brion hurried after her, not wanting to miss the first human spark of interest in the trip to date.

"Kidnaped! Lied to and forced against my will! There is no court in the galaxy that won't give you the maximum sentence and I'll scream with pleasure as they roll your fat body into solitary—"

"They shouldn't have sent a woman," Ihjel said, completely ignoring her words. "I asked for a highly-qualified exobiologist for a difficult assignment. Someone young and tough enough to do field work under severe conditions. So the recruiting office sends me the smallest female they can find, one who'll melt in the first rain."

"I will not!" Lea shouted. "Female resiliency is a well known fact and I'm in far better condition than the average woman. Which has nothing to do with what I'm telling you. I was hired for a job in the university on Moller's World and signed a contract to that effect. Then this bully of an agent tells me the contract has been changed, read sub paragraph 189-C or some such nonsense, and I'll be transshipping. He stuffed me into that suffocation basketball without a by-your-leave and they threw me overboard. If that is not a violation of personal privacy—"

"Cut a new course, Brion," Ihjel broke in. "Find the nearest settled planet and head us there. We have to drop this woman and find a man for this job. We are going to what is undoubtedly the most interesting planet an exobiologist ever conceived of, but we need a man who can take

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orders and not faint when it gets too hot."

Brion was lost. Ihjel had done all the navigating and Brion had no idea how to begin a search like this.

"Oh no you don't," Lea said. "You don't get rid of me that easily. I placed first in my class and most of the five-hundred other students were male. This is only a man's universe because the men say so. What is the name of this garden planet where we are going?"

"Dis. I'll give you a briefing as soon as I get this ship on course." He turned to the controls and Lea slipped out of her suit and went into the lavatory to comb her hair. Brion closed his mouth, aware suddenly it had been open for a long time. "Is that what you call applied psychology?" he asked.

"Not really. She was going to go along with the job in the end—since she did sign the contract even if she didn't read the fine print—but not until she had exhausted her feelings. I just shortened the process by switching her onto the male-superiority hate. Most women, who succeed in normally masculine fields, have a reflexive antipathy there, they have been hit on the head with it so much." He fed the course tape into the console and scowled. "But there was a good chunk of truth in what I said. I wanted a young, fit and highly qualified biologist from recruiting. I never thought they would find a female one. And it's too late to send her back now. Dis is no place for a woman."

"Why?" Brion asked, as Lea appeared in the doorway.

"Come inside, and I'll show you both," Ihjel said.

V

"Dis," Ihjel said, consulting a thick file. "Third planet out from its primary, Epsilon Eridani. The fourth planet is Nyjord—remember hat because it is going to be very important. Dis is a place you need a good reason to visit and no reason at all to leave. Too hot, too dry, the temperature in the temperate zones rarely drops below a hundred Fahrenheit. The planet is nothing but scorched rock and burning sand. Most of the water is underground and normally inaccessible. The surface water is all in the form of briney, chemically saturated swamps. Undrinkable without extensive processing. All the facts and figures are here in the folder and you can study them later. Right now I want you just to get the idea that this planet is as loathsome and inhospitable as they come. So are the people. This is a solido of a Disan."

Lea gasped at the three-dimensional representation on the screen. Not at the physical aspects of the man, as a biologist trained in the specialty of alien life she had seen a lot stranger sights. It was the man's pose, the expression on his face. Tensed to leap, his lips drawn back to show all of his teeth.

"He looks like he wanted to kill the photographer," she said.

"He almost did—just after the

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picture was taken. Like all Disans he has an overwhelming hatred and loathing of offworlders. Not without good reason though. His planet was settled completely by chance during the Breakdown. I'm not sure of the details, but the overall picture is clear, since the story of their desertion forms the basis of all the myths and animistic religions on Dis.

"Apparently there were large scale mining operations carried on there once, the world is rich enough in minerals and mining it is very simple. But water came only from expensive extraction processes and I imagine most of the food came from offworld. Which was good enough until the settlement was forgotten, the way a lot of other planets were during the Breakdown. All the records were destroyed in the fighting and the ore carriers pressed into military service. Dis was on its own. What happened to the people there is a tribute to the adaptation possibilities of Homo sapiens. Individuals died, usually in enormous pain, but the race lived. Changed a good deal, but still human.

"As the water and food ran out and the extraction machinery broke down, they must have made heroic efforts to survive. They didn't do it mechanically, but by the time the last machine collapsed, enough people were adjusted to the environment to keep the race going. Third descendants are still there, completely adapted to the environment. Their body temperatures are around one hundred and thirty degrees. They have specialized tissue in the gluteal area for storing water. These are minor changes compared to the major ones they have done in fitting themselves for this planet.

"I'm not sure of the exact details, but the reports are very enthusiastic about symbiotic relationships. They assure us that this is the first time Homo sapiens has been an active part of either commensalism or inquilinism other than in the role of host."

"Wonderful!" Lea enthused.

"Is it?" Ihjel scowled. "Perhaps from the abstract scientific point of view. If you can keep notes, perhaps you might write a book about it some time. But I'm not interested. I'm sure all these morphological changes and disgusting intimacies will fascinate you, Dr. Morees. But while you are counting blood types and admiring your thermometers, I hope you will be able to devote a little time to a study of the Disans' obnoxious personalities. We must either find out what makes these people tick—or we are going to have to stand by and watch the whole lot blown up!"

"Going to do what?" Lea gasped. "Destroy them? Wipe out this fascinating genetic pool? Why?"

"Because they are so incredibly loathsome, that's why!" Ihjel said. "These aboriginal hotheads have managed to lay their hands on some primitive cobalt bombs. They want to light the fuze and drop these bombs on Nyjord, the next planet. Nothing said or done can convince

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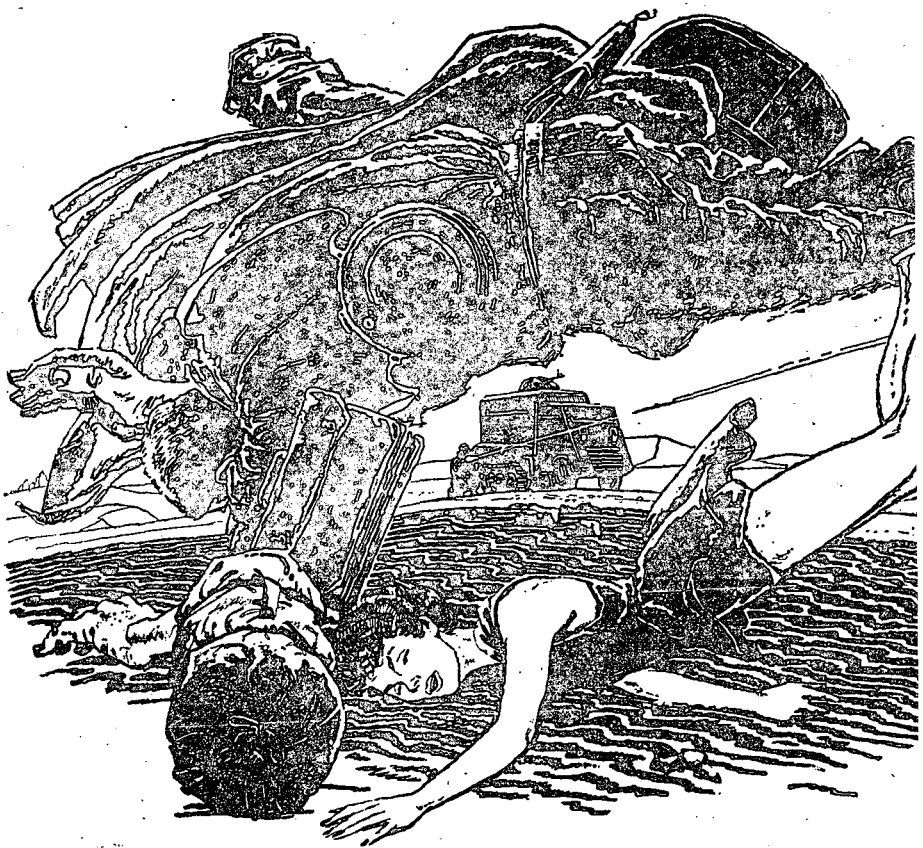

them differently. They demand unconditional surrender or else. This is impossible for a lot of reasons—most important because the Nyjorders would like to keep their planet for their very own. They have tried every kind of compromise but none of them work. The Disans are out to commit racial suicide. A Nyjord fleet is now over Dis and the deadline has almost expired for the surrender of the cobalt bombs. The Nyjord ships carry enough H-bombs to turn the entire planet into an atomic pile. That is what we must stop."

Brion looked at the solido on the screen, trying to make some judgment of the man. Bare, horny feet—a bulky, ragged length of cloth around the waist was the only garment. What looked like a piece of green vine was hooked over one shoulder. From a plaited belt were

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suspended a number of odd devices made of hand-beaten metal, drilled stone and looped leather. The only recognizable one was a thin knife of unusual design. Loops of piping, flared bells, carved stones tied in senseless patterns of thonging gave the rest of the collection a bizarre appearance. Perhaps they had some religious significance. But the well-worn and handled look of most of them gave Brion an uneasy sensation. If they were used—what in the universe could they be used *for?*"

"I can't believe it," he finally concluded. "Except for the exotic hardware, this lowbrow looks like he has sunk back into the stone age. I don't see how his kind can be of any real threat to another planet."

"The Nyjorders believe it, and that's good enough for me," Ihjel said. "They are paying our Cultural Relationships Foundation a good sum to try and prevent this war. Since they are our employers we must do what they ask." Brion ignored this large lie, since it was obviously designed as an explanation for Lea. But he made a mental note to query Ihjel later about the real situation.

"Here are the tech reports." Ihjel dropped them on the table. "Dis has some spacers as well as the cobalt bombs—though these aren't the real threat. A tramp trader was picked up *leaving* Dis. It had delivered a jump-space launcher that can drop those bombs on Nyjord while anchored to the bedrock of Dis. While essentially a peaceful and happy people the Nyjorders were justifiably annoyed at this and convinced the tramp's captain to give them some more information. It's all here. Boiled down it gives a minimum deadline by which time the launcher can be set up and start throwing bombs."

"When is that deadline?" Lea asked.

"In ten days. If the situuation hasn't been changed drastically by then the Nyjorders are going to wipe all life

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from the face of Dis. I assure you they don't want to do it. But they will drop the bombs in order to assure their own survival."

"What am I supposed to do?" Lea asked, annoyedly flipping the pages of the report. "I don't know a thing about nucleonics or jump-space. I'm an exobiologist with a supplementary degree in anthropology. What help could I possibly be?"

Ihjel looked down at her, fondling his jaw, fingers sunk deep into the rolls of flesh. "My faith in our recruiters is restored," he said. "That's a combination that is probably rare—even on Earth. You're as scrawny as an underfed chicken but young enough to survive if we keep a close eye on you." He cut off Lea's angry protest with a raised hand. "No more bickering. There isn't time. The Nyjorders must have lost over thirty agents trying to find the bombs. Our Foundation has had six people killed—including my late predecessor in charge of the project. He was a good man, but I think he went at this problem the wrong way. I think it is a cultural one, not a physical one."

"Run it through again with the power turned up," Lea said, frowning. "All I hear is static."

"It's the old problem of genesis. Like Newton and the falling apple, Levy and the hysteresis in the warp field. Evrything has a beginning. If we can find out why these people are so hell-bent on suicide, we might be able to change the reasons. Not that I intend to stop looking for the bombs or the jump-space generator either. We are going to try anything that will avert this planetary murder."

"You're a lot brighter than you look," Lea said, rising and carefully stacking the sheets of the report. "You can count on me for complete co-operation. Now I'll study all this in bed if one of you overweight gentlemen will show me to a room with a strong lock on the inside of the door. Don't call me, I'll call you when I want breakfast."

Brion wasn't sure how much of her barbed speech was humor and how much serious, so he said nothing. He showed her to an empty cabin—she did lock the door—then looked for Ihjel. The Winner was in the galley adding to his girth with an immense gelatin dessert that filled a good-sized tureen.

"Is she short for a native Terran?" Brion asked. "The top of her head is below my chin."

"That's the norm. Earth is a reservoir of tired genes. Weak backs, vermiform appendixes, bad eyes. If they didn't have the universities and the trained people we need, I would never use them."

"Why did you lie to her about the Foundation?"

"Because it's a secret—isn't that reason enough?" Ihjel rumbled angrily, scraping the last dregs from the bowl. "Better eat something. Build up the strength. The Foundation has to maintain its undercover status if it is going to accomplish anything. If she returns to Earth aft-

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er this, it's better that she should know nothing of our real work. If she joins up, there'll be time enough to tell her. But I doubt if she will like the way we operate. Particularly since I plan to drop some H-bombs on Dis myself—if we can't turn off the war."

"I don't believe it!"

"You heard me correctly. Don't bulge your eyes and look moronic. As a last resort I'll drop the bombs myself, rather than let the Nyjorders do it. That might save them."

"Save them—they'd all be radiated and dead!" Brion's voice was raised in anger.

"Not the Disans. I want to save the Nyjorders. Stop clenching your fists and sit down and have some of this cake. It's delicious. The Nyjorders are all that counts here. They have a planet blessed by the laws of chance. When Dis was cut off from outside contact the survivors turned into a gang of swamp-crawling homicidals. It did the opposite for Nyjord. You can survive there just by pulling fruit off a tree.

"The population was small, educated, intelligent. Instead of sinking into an eternal siesta they matured into a vitally different society. Not mechanical—they weren't even using the wheel when they were rediscoverd. They became sort of cultural specialists, digging deep into the philosphical aspects of interrelationship. The thing that machine societies never have had time for. Of course this was ready made for the Cultural Relationships Foundation, and we have been working with them ever since. Not guiding so much as protecting them from any blows that might destroy this growing idea. But we've fallen down on the job.

"Nonviolence is essential to these people—they have vitality without needing destruction. But if they are forced to blow up Dis for their own survival—against every one of their basic tenets—their philosophy won't endure. Physically they'll live on. As just one more dog-eat-dog planet with an A-bomb for any of the competition who drop behind."

"Sounds like paradise now."

"Don't be smug. It's just another worldful of people with the same old likes, dislikes and hatreds. But they are evolving a way of living together, without violence, that may some day form the key to mankind's survival. They are worth looking after. Now get below and study your Disan and read the reports. Get it all pat before we land."

VI

"Identify yourself, please." The quiet words from the speaker in no way appeared to coincide with the picture on the screen. The spacer that had matched their orbit over Dis had recently been a freighter. A quick conversion had tacked the hulking shape of a primary weapons turret on top of her hull. The black disk of the immense muzzle pointing squarely at them. Ihjel switched open the ship-to-ship communication channel.

"This is Ihjel. Retinal pattern 490-

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Bj4-67—which is also the code that is supposed to get me through your blockade. Do you want to check that pattern?"

"There will be no need, thank you. If you will turn on your recorder, I have a message relayed to you from Prime-four."

"Recording and out," Ihjel said. "Damn! Trouble already and four days to blowup. Prime-four is our headquarters on Dis. This ship carries a cover cargo so we can land at the spaceport. This is probably a change of plan and I don't like the smell of it."

There was something behind Ihjel's grumbling this time, and without conscious effort Brion could sense the chilling touch of the other man's *angst*. Trouble was waiting for them on the planet below. When the message was typed by the decoder Ihjel hovered over it, reading each word as it appeared on the paper. He only snorted when it was finished and went below to the galley. Brion pulled the message out of the machine and read it.

IHJEL IHJEL IHJEL SPACEPORT LANDING DANGER NIGHT LANDING PREFERABLE CO-ORDINATES MAP 46 J92 MN75 REMOTE YOUR SHIP VION WILL MEET END END END

Dropping into the darkness was safe enough. It was done on instruments and the Disans were thought to have no detection apparatus. The altimeter dials spun backwards to zero and a soft vibration was the only indication they had landed. All of the cabin lights were off except for the fluorescent glow of the instruments. A white-speckled gray filled the infrared screen, radiation from the still-warm sand and stone. There were no moving blips on it, nor the characteristic shape of a shielded atomic generator.

"We're here first," Ihjel said, opaquing the ports and turning on the cabin lights. They blinked at each other, faces damp with perspiration.

"Must you have the ship this hot?" Lea asked, patting her forehead with an already sodden kerchief. Stripped of her heavier clothing she looked even tinier to Brion. But the thin cloth tunic—reaching barely halfway to her knees—concealed very little. Small she may have appeared to him—unfeminine she was not. In fact she was quite attractive.

"Shall I turn around so you can stare at the back, too?" she asked Brion. Five days' experience had taught him that this type of remark was best ignored. It only became worse if he tried to answer.

"Dis is hotter than this cabin," he said, changing the subject. "By raising the interior temperature we can at least prevent any sudden shock when we go out—"

"I know the theory—but it doesn't stop me from sweating," she snapped.

"Best thing you can do is sweat," Ihjel said. He looked like a glistening captive balloon in shorts. Finishing a bottle of beer he took another from the freezer. "Have a beer."

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"No thank you. I'm afraid it would dissolve the last shreds of tissue and my kidneys would float completely away. On Earth we never—"

"Get Professor Morees' luggage for her," Ihjel said. "Vion's coming, there's his signal. I'm sending this ship up before any of the locals spot it."

When he cracked the outer port the puff of air struck them like the exhaust from a furnace. Dry and hot as a tongue of flame. Brion heard Lea's gasp in the darkness. She stumbled down the ramp and he followed her slowly, careful of the weight of packs and equipment he carried. The sand burned through his boots, still hot from the day. Ihjel came last, the remote-control unit in his hand. As soon as they were clear he activated it and the ramp slipped back like a giant tongue. As soon as the lock had swung shut the ship lifted and drifted upwards silently towards its orbit, a shrinking darkness against the stars.

There was just enough starlight to see the sandy wastes around them, as wave-filled as a petrified sea. The dark shape of a sand car drew up over a dune and hummed to a stop. When the door opened Ihjel stepped towards it and everything happened at once.

Ihjel broke into a blue nimbus of crackling flame, his skin blackening, charred, dead in an instant. A second pillar of flame bloomed next to the car and a choking scream, cut off even as it began. Ihjel died silently.

Brion was diving even as the electrical discharges still crackled in the air. The boxes and packs dropped from him and he slammed against Lea, knocking her to the ground. He hoped she had the sense to stay there and be quiet. This was his only conscious thought, the rest was reflex. Rolling over and over as fast as he could.

The spitting electrical flames flared again, playing over the bundles of luggage he had dropped. This time Brion was expecting it, pressed flat to the ground a short distance away. He was facing the darkness away from the sandcar and saw the brief, blue glow of the ion-rifle discharge. His own gun was in his hand. When Ihjel had given him the missile weapon he had asked no questions, just strapped it on. There had been no thought that he would need it this quickly. Holding it firmly before him in both hands he let his body aim at the spot where the glow had been. A whiplash of explosive slugs ripped the night air. They found their target and something thrashed voicelessly and died.

In the brief instant after he fired a jarring weight landed on his back and a line of fire circled his throat. Normally he fought with a calm mind, with no thoughts other than the contest. But Ihjel, a friend, a man of Anvhar, had died a few seconds earlier and Brion found himself welcoming this physical violence and pain.

There are many foolish and dangerous things that can be done, such

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as smoking next to high octane fuel and putting fingers into electrical sockets. Just as dangerous, and equally deadly, is physically attacking a Winner of the Twenties.

Two men hit Brion together, though this made very little difference. The first died suddenly as hands like steel claws found his neck and in a single spasmodic contraction did such damage to the large blood vessels there that they burst and tiny hemorrhages filled his brain. The second man had time for a single scream, though he died just as swiftly when those hands closed on his larynx.

Running in a crouch, partially on his knuckles, Brion swiftly made a circle of the area, gun ready. There were no others. Only when he touched the softness of Lea's body did the blood anger seep from him. He was suddenly aware of the pain and fatigue, the sweat soaking his body and the breath rasping in his throat. Holstering the gun he ran light fingers over her skull, finding a bruised spot on one temple Her chest was rising and falling regularly. She had struck her head when he pushed her. It had undoubtedly saved her life.

Sitting down suddenly he let his body relax, breathing deeply. Everything was a little better now, except for the pain at his throat. His fingers found a thin strand on the side of his neck with a knobby weight on the end. There was another weight on his other shoulder and a thin line of pain across his neck. When he pulled on them both the strangler's cord came away in his hand. It was thin fiber, strong as a wire. When it had been pulled around his neck it had sliced the surface skin and flesh like a knife, halted only by the corded bands of muscle below. Brion threw it from him, into the darkness where it had come from.

He could think again and he carefully kept his thoughts from the men he had killed. Knowing it was useless he went to Ihjel's body. A single touch of the scorched flesh was enough.

Behind him Lea moaned with returning consciousness and he hurried on to the sand car, stepping over the charred body outside the door. The driver was slumped, dead, killed perhaps by the same strangling cord that had sunk into Brion's throat. He laid the man gently on the sand and closed the lids over the staring horror of the eyes. There was a canteen in the car and he brought it back to Lea.

"My head—I've hurt my head," Lea said groggily.

"Just a bruise," he reassured her. "Drink some of this water and you'll soon feel better. Lie back. Everything's over for the moment and you can rest."

"Ihjel's dead!" she said with sudden shocked memory. "They've killed him! What's happened?" She tensed, tried to rise, and he pressed her back gently.

"I'll tell you everything. Just don't try to get up yet. There was an ambush and they killed Vion and the dri-

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ver of the sand car, as well as Ihjel. Three men did it and they're all dead now, too. I don't think there are any more around, but if there are I'll hear them coming. We're just going to wait a few minutes until you feel better then we're getting out of here in the car."

"Bring the ship down!" There was a thin edge of hysteria in her voice. "We can't stay here alone. We don't know where to go or what to do. With Ihjel dead the whole thing's spoiled. We have to get out—"

There are some things that can't sound gentle, no matter how gently they are said. This was one of them. "I'm sorry, Lea, but the ship is out of our reach right now. Ihjel was killed with an ion gun and it fused the control unit into a solid lump. We must take the car and get to the city. We'll do it now. See if you can stand up—I'll help you."

She rose, not saying anything, and as they walked towards the car a single, reddish moon cleared the hills behind them. In its light Brion saw a dark line bisecting the rear panel of the sand car. He stopped abruptly. "What's the matter?" Lea asked.

The unlocked engine cover could have only one significance and he pushed it open knowing in advance what he would see. The attackers had been very thorough and fast. In the short time available to them they had killed the driver and the car as well. Ruddy light shone on torn wires, ripped out connections. Repair would be impossible.

"I think we'll have to walk," he told her, trying to keep the gloom out of his voice. "This spot is roughly a hundred and fifty meters from the city of Hovedstad, where we have to go. We should be able to—"

"We're going to die. We can't walk anywhere. This whole planet is a death trap. Let's get back in the ship!" There was a thin shrillness of hysteria at the edge of her voice, as well as a subtle slurring of the sounds.

Brion didn't try to reason with her or bother to explain. She had a concussion from the blow, that much was obvious. He made her sit and rest while he made what preparations he could for the long walk.

Clothing first. With each passing minute the desert air was growing colder as the day's heat ebbed away. Lea was beginning to shiver and he took some heavier clothing from her charred bag and made her pull it on over her light tunic. There was little else that was worth carrying. The canteen from the car and a first-aid kit he found in one of the compartments. There were no maps or radio. Navigation was obviously done by compass on this almost-featureless desert. The car was equipped with an electrically operated gyro-compass, of no possible use to him. He did use it to check the direction to Hovedstad, as he remembered it from the map, and found it lined up perfectly with the tracks the car had cut into the sand. It had come directly from the city. They could find their way by back-tracking.

Time was slipping away. He would like to have buried Ihjel and the men

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from the car, but the night hours were too valuable to be wasted. The best he could do was put the three corpses in the car, for protection from the Disan animals. Locking the door he threw the key as far as he could in the blackness. Lea had slipped into a restless sleep and he carefully shook her awake.

"Come," Brion said, "we have a little walking to do."

VII

With the cool air and firmly packed sand under foot walking should have been easy. Lea spoiled that. The concussion seemed to have temporarily cut off the reasoning part of her brain leaving a direct connection to her vocal cords. As she stumbled along, only half conscious, she mumbled all of her darkest fears that were better left unvoiced. Occasionally there was relevancy in her complaints. They would lose their way, never find the city, die of thirst, freezing, heat or hunger. Interspersed and entwined with these were fears from her past that still floated, submerged in the timeless ocean of her subconscious. Some Brion could understand, though he tried not to listen. Fears of losing credits, not getting the highest grade, falling behind, a woman alone in a world of men, leaving school, being lost, trampled among the nameless hordes that struggled for survival in the crowded city-states of Earth.

There were other things she was afraid of that made no sense to a man of Anvhar. Who were the alkians that seemed to trouble her? Or what was canceri? Daydle and haydle? Who was Manstan whose name kept coming up, over and over, each time accompanied by a little moan?

Brion stopped and picked her up in both arms. With a sigh she settled against the hard width of his chest and was instantly asleep. Even with the additional weight he made better time now, and he stretched to his fastest, kilometer-consuming stride to make good use of these best hours.

Somewhere on a stretch of gravel and shelving rock he lost the track of the sand car. He wasted no time looking for it. By carefully watching the glistening stars rise and set he had made a good estimate of the geographic north. Dis didn't seem to have a pole star, however a boxlike constellation turned slowly around the invisible point of the pole. Keeping this positioned in line with his right shoulder guided him on the westerly course he needed.

When his arms began to grow tired he lowered Lea gently to the ground, she didn't wake. Stretching for an instant, before taking up his burden again, Brion was struck by the terrible loneliness of the desert. His breath made a vanishing mist against the stars, all else was darkness and silence. How distant he was from his home, his people, his planet. Even the constellations of the night sky were different. He was used to solitude, but this was a loneliness that touched some deep-buried instinct. A shiver that wasn't from the

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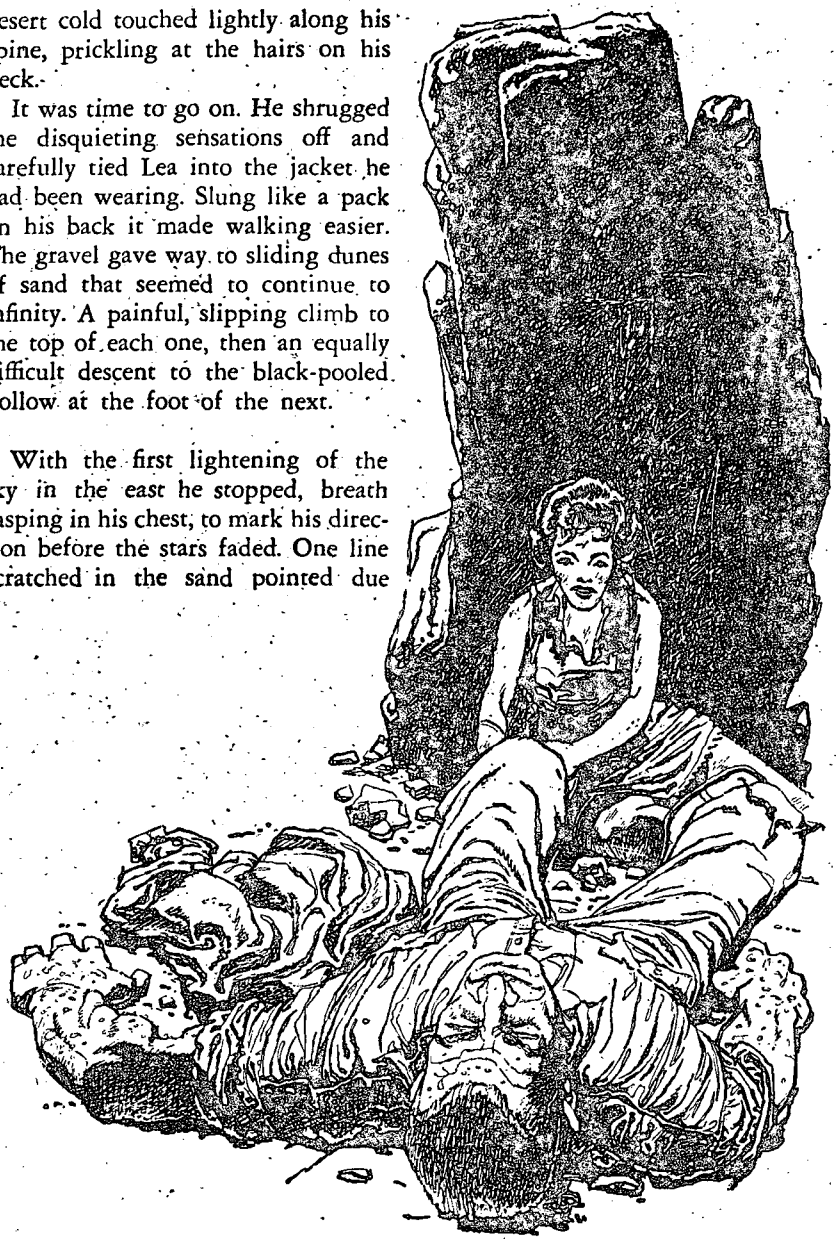
desert cold touched lightly along his spine, prickling at the hairs on his neck.

It was time to go on. He shrugged the disquieting sensations off and carefully tied Lea into the jacket he had been wearing. Slung like a pack on his back it made walking easier. The gravel gave way to sliding dunes of sand that seemed to continue to infinity. A painful, slipping climb to the top of each one, then an equally difficult descent to the black-pooled hollow at the foot of the next.

With the first lightening of the sky in the east he stopped, breath rasping in his chest, to mark his direction before the stars faded. One line scratched in the sand pointed due



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north, a second pointed out the course they should follow. When they were aligned to his satisfaction he washed his mouth out with a single swallow of water and sat on the sand next to the still form of the girl.

Gold fingers of fire searched across the sky, wiping out the stars. It was magnificent, Brion forgot his fatigue in appreciation. There should be some way of preserving it. A quatrain would be best. Short enough to be remembered, yet requiring attention and skill to compact everything into it. He had scored high with his quatrains in the Twenties. This would be a special one. Taind, his poetry mentor would have to get a copy.

"What are you mumbling about?" Lea asked, looking up at the craggy blackness of his profile against the reddening sky.

"Poem," he said. "*Shhh.* Just a minute."

It was too much for Lea, coming after the tension and dangers of the night. She began to laugh, laughing even harder when he scowled at her angrily. Only when she heard the tinge of growing hysteria did she make an attempt to break off the laughter. The sun cleared the horizon, washing a sudden warmth over them. Lea gasped.

"Your throat's been cut! You're bleeding to death!"

"Not really," he said, touching his fingertips lightly against the blood-clotted wound that circled his neck. "Just superficial."

Depression sat on him as he suddenly remembered the battle and death of the previous night. Lea didn't notice his face, she was busy digging in the pack he had thrown down. He had to use his fingers to massage and force away the grimace of pain that twisted his mouth. Memory was more painful than the wound. How easily he had killed. Three men. How close to the surface of the civilized man the animal dwelled. In countless matches he had used those holds, always drawing back from the exertion of the full killing power. They were part of a game, part of the Twenties. Yet when his friend had been killed he had become a killer himself. He believed in nonviolence and the sanctity of life. Until the first test when he had killed without hesitation. More ironic was the fact he really felt no guilt. Shock at the change, yes. But no more than that.

"Lift your chin," Lea said, brandishing the antiseptic applier she had found in the medicine kit. He lifted obligingly and the liquid drew a cool, burning line across his neck. Antibio pills would do a lot more good, since the wound was completely clotted by now, but he didn't speak his thoughts aloud. For the moment Lea had forgotten herself in taking care of him. He put some of the antiseptic on her scalp bruise and she squeaked, pulling back. They both swallowed the pills.

"That sun is hot already," Lea grumbled, peeling off her heavy clothing. "Let's find a nice cool cave to crawl into for the day."

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"I don't think there are any here. Just sand. We have to walk—"

"I know we have to walk," she interrupted angrily. "There's no need for a lecture about it. You're as seriously cubical as the Bank of Terra. Relax. Take ten and start again." Lea was making empty talk while she listened to the memory of hysteria tittering at the fringes of her brain.

"No time for that. We have to keep going." Brion climbed slowly to his feet after stowing everything in the pack. When he sighted along his marker at the western horizon he saw nothing to mark their course, only the marching dunes. He helped Lea to her feet and began walking slowly towards them.

"Just hold on a second," Lea called after him. "Where do you think you're going?"

"In that direction," he said, pointing. "I hoped there would be some landmarks. There aren't. We'll have to keep on by dead reckoning. The sun will keep us pretty well on course. If we aren't there by night, the stars will be a better guide."

"All this on an empty stomach? How about breakfast? I'm hungry—and thirsty."

"No food." He shook the canteen that gurgled emptily. It had been only partly filled when he found it. "The water's low and we'll need it later."

"I need it now," she snapped. "My mouth tastes like an unemptied ashtray and I'm dry as paper."

"Just a single swallow," he said. "This is all we have."

Lea sipped at it with her eyes closed in appreciation. He sealed the top and returned it to the pack without taking any himself. They were sweating as they started up the first dune.

The desert was barren of life; they were the only things moving under that merciless sun. Their shadows pointed the way ahead of them, and as the shadows shortened the heat rose. It had an intensity Lea had never experienced before, a physical weight that pushed at her with a searing hand. Her clothing was sodden with perspiration, and it trickled burning into her eyes. The light and heat made it hard to see and she leaned on the immovable strength of Brion's arm. He walked on steadily, apparently ignoring the heat and discomfort.

"I wonder if those things are edible—or store water?" Brion's voice was a harsh rasp. Lea blinked and squinted at the leathery shape on the summit of the dune. Plant or animal, it was hard to tell. The size of a man's head, wrinkled and gray as dried-out leather, knobbed with thick spikes. Brion pushed it up with his toe and they had a brief glimpse of a white roundness, like a shiny taproot, going down into the dune. Then the thing contracted, pulling itself lower into the sand. At the same instant something thin and sharp lashed out through a fold in the skin, striking at Brion's boot and withdrawing. There was a scratch on the hard plastic, beaded with drops of green liquid.

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"Probably poison," he said, digging his toe into the sand. "This thing is too mean to fool with—without a good reason. Let's keep going."

It was before noon when Lea fell down. She really wanted to go on, but her body wouldn't obey. The thin soles of her shoes were no protection against the burning sand and her feet were lumps of raw pain. Heat hammered down, poured up from the sand and swirled her in an oven of pain. The air she gasped in was molten metal that dried and cracked her mouth. Each pulse of her heart throbbed blood to the wound in her scalp until it seemed her skull would burst with the agony. She had stripped down to the short tunic—in spite of Brion's insistence that she keep her body protected from the sun—and that clung to her, soaked with sweat. She tore at it in a desperate effort to breathe. There was no escape from the unending heat.

Though the baked sand burned torture into her knees and hands she couldn't rise. It took all her strength not to fall farther. Her eyes closed and everything swirled in immense circles.

Brion blinking through slitted eyes, saw her go down. He lifted and carried her again as he had the night before. The hot touch of her body shocked his bare arms. Her skin was flushed pink. Wiping his palm free of sweat and sand he touched her skin and felt the ominous hot dryness.

Heat-shock, all the symptoms. Dry, flushed skin, the ragged breathing. Her temperature rising quickly as her body stopped fighting the heat and succumbed.

There was nothing he could do here to protect her from the heat. He measured a tiny portion of the remaining water into her mouth and she swallowed convulsively. The thinnest of the clothing protected her slight body from the direct rays of the sun. After that he could only take her in his arms and keep on towards the horizon. An outcropping of rock threw a tiny patch of shade and he walked towards it.

The ground here, shielded from the direct rays of the sun, felt almost cool by contrast. Lea opened her eyes when he put her down, peering up at him through a haze of pain. She wanted to apologize to him for her weakness, but no words came from the dried membrane of her throat. His body above her seemed to swim back and forth in the heat waves, swaying like a tree in a high wind.

Snock drove her eyes open, cleared her mind for the instant. He really was swaying. With sudden horror she realized how much she had come to depend on the eternal solidity of his strength. Now it was failing. All over his body the corded muscles contracted in ridges, striving to keep him erect. She saw his mouth pulled open by the taut cords of his neck and the gaping, silent scream was more terrible than any sound. Then she screamed herself as his eyes rolled back, leaving just the empty

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white of the eyeballs staring terribly at her. He went over, back, down, like a felled tree, thudding heavily on the sand. Unconscious or dead she couldn't tell. She pulled limply at his leg, but couldn't drag his immense weight into the shade.

Brion lay on his back in the sun, sweating. Lea saw this and knew that he was still alive. Yet what was happening? She groped for memory in the red haze of her mind, but could remember nothing from her medical studies that would explain this. On every square inch of his body the sweat glands seethed with sudden activity. From every pore oozed great globules of oily liquid, far thicker than normal perspiration. Brion's arms rippled with motion and Lea stared, horrified as the hairs there writhed and stirred as though endowed with separate life. His chest rose and fell rapidly, deep, gasping breaths wracking his body. Lea could only stare through the dim redness of unreality and wonder if she was going mad before she died.

A coughing fit broke the rhythm of his rasping breath, and when it was over his breathing was easier. The perspiration still covered his body, the individual beads touching and forming tiny streams that seeped down his body and vanished in the sand. He stirred and rolled onto his side, facing her. His eyes open and normal now as he smiled.

"Didn't mean to frighten you. It caught me suddenly, coming at the wrong season and everything. It was a bit of a jar to my system. I'll get you some water now, there's still a bit left."

"What happened? When you looked like that, when you fell—"

"Take two swallows, no more," he said, holding the open canteen to her mouth. "Just summer change, that's all. Happens to us every year on Anvhar—only not that violently, of course. In the winter our bodies store a layer of fat under the skin for insulation and sweating almost ceases completely. Lot of internal changes, too. When the weather warms up the process is reversed. The fat is metabolized and the sweat glands enlarge and begin working overtime as the body prepares for two months of hard work, heat and little sleep. I guess the heat here triggered off the summer change early."

"You mean—you've adapted to this terrible planet?"

"Just about. Though it does feel a little warm. I'll need a lot more water soon, so we can't remain here. Do you think you can stand the sun if I carry you?"

"No, but I won't feel any better staying here." She was light-headed, scarcely aware of what she said. "Keep going, I guess. Keep going."

As soon as she was out of the shadow of the rock the sunlight burst over her again in a wave of hot pain. She was unconscious at once. Her slight weight was no burden to Brion and he made his best speed, heading towards the spot on the horizon where the sun would set. Without water he knew he could not last more than a day or two at best.

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When sunset came he was still walking steadily. Only when the air chilled did he stop to dress them both in the warm clothes and push on. Lea regained consciousness in the cool night air and finished the last mouthfuls of water. She wanted to walk, but could only moan with pain when her burned feet touched the ground. He put ointment on them and wrapped them in cloth. They were too swollen to go back into the ragged shoes. Lifting his burden he walked on into the night, following the guiding stars.

Except for the nagging thirst, it was an easy night. He wouldn't need sleep for two or three days more, so that didn't bother him. His muscles had a plentiful supply of fuel at hand in the no longer wanted subcutaneous fatty layer. Metabolizing it kept him warm. By running at a ground-eating pace whenever the footing was smooth he made good time. By dawn he was feeling a little tired and was at least ten kilos lighter due to the loss of the burned up fat.

There was no sight of the city yet. This was the last day. Massive as the adaptation of his body was to the climate, it still needed water to function. As his pores opened in the heat he knew the end was very close. Weaving, stumbling, trying not to fall with the unconscious girl, he climbed dune after unending dune. Before his tortured eyes the sun expanded and throbbed like a gigantic beating heart. He struggled to the top of the mountain of sand and looked at the Disan standing a few feet away.

They were both too surprised by the sudden encounter to react at once. For a breath of time they stared at each other, unmoving. When they reacted it was with the same defense of fear. Brion dropped the girl, bringing the gun up from the holster in the return of the same motion. The Disan jerked a belled tube from his waistband and raised it to his mouth.

Brion didn't fire. A dead man had taught him how to train his emphathetic sense, and to trust it. In spite of the fear that wanted him to jerk the trigger, a different sense read the unvoiced emotions of the native Disan. There was fear there, and hatred. Welling up around these was a strong desire not to commit violence this time, to communicate instead. Brion felt and recognized all this in a small part of a second. He had to act instantly to avoid a tragic accident. A jerk of his wrist threw the gun to one side.

As soon as it was gone he regretted his loss. He was gambling their lives on an ability he still was not sure of. The Disan had the tube to his mouth when the gun hit the ground. He held the pose, unmoving, thinking. Then he accepted Brion's action and thrust the tube back into his waistband.

"Do you have any water?" Brion asked, the guttural Disan words hurting his throat.

"I have water," the man said. He still didn't move. "Who are you?"

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"We're from offplanet. We had . . . an accident. We want to go to the city. The water."

The Disan looked at the unconscious girl and made his decision. Over one shoulder he wore one of the green objects that Brion remembered from the solido. He pulled it off and the thing writhed slowly in his hands. It was alive. A green length a meter long, like a noduled section of a thick vine. One end flared out into a petallike formation. The Disan took a hook-shaped object from his waist and thrust it into the petaled orifice. When he turned the hook in a quick motion the length of green writhed and curled around his arm. He pulled something small and dark out and threw it to the ground, extending the twisting green shape towards Brion. "Put your mouth to the end and drink," he said.

Lea needed the water more, but he drank first, suspicious of the living water source. A hollow below the writhing petals was filling with straw-colored water from the fibrous, reedy interior. He raised it to his mouth and drank. The water was hot and tasted swampy. Sudden sharp pains around his mouth made him jerk the thing away. Tiny glistening white barbs projected from the petals, pink tipped now with his blood. Brion swung towards the Disan angrily—and stopped when he looked at the other man's face. His mouth was surrounded by many small scars.

"The vaede does not like to give up its water, but it always does," the man said.

Brion drank again then put the vaede to Lea's mouth. She moaned without regaining consciousness, her lips seeking reflexively for the life-saving liquid. When she was satisfied Brion gently drew the barbs from her flesh and drank again. The Disan hunkered down on his heels and watched them expressionlessly. Brion handed back the vaede, then held some of the clothes so Lea was in their shade. He settled into the same position as the native and looked closely at him.

Squatting immobile on his heels, the Disan appeared perfectly comfortable under the flaming sun. There was no trace of perspiration on his naked, browned skin. Long hair fell to his shoulders and startlingly blue eyes stared back at Brion from deep-set sockets. The heavy kilt around his loins was the only garment he wore. Once more the vaede rested over his shoulder, still stirring unhappily. Around his waist was the same collection of leather, stone and brass objects that had been in the solido. Two of them now had meaning to Brion. The tube-and-mouthpiece; a blowgun of some kind. And the specially shaped hook for opening the vaede. He wondered if the other strangely formed things had equally realistic functions. If you accepted them as artifacts with a purpose—not barbaric decorations—you had to accept their owner as something more than the crude savage he resembled.

"My name is Brion. And you—"

"You may not have my name.

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Why are you here? To kill my people?"

Brion forced the memory of the last night away. Killing was just what he had done. Some expectancy in the man's manner, some sensed feeling of hope prompted Brion to speak the truth.

"I'm here to stop your people from being killed. I believe in the end of the war."

"Prove it."

"Take me to the Cultural Relationships Foundation in the city and I'll prove it. I can do nothing here in the desert. Except die."

For the first time there was emotion on the Disan's face. He frowned and muttered something to himself. There was a fine beading of sweat above his eyelids now as he fought an internal battle. Coming to a decision he rose, and Brion stood, too.

"Come with me. I'll take you to Hovestad. But wait, there is one thing I must know. Are you from Nyjord?"

"No."

The nameless Disan merely grunted and turned away. Brion shouldered Lea's unconscious body and followed him. They walked for two hours, the Disan setting a cruel pace, before they reached a wasteland of jumbled rock. The native pointed to the highest tower of sand-eroded stone. "Wait near this," he said. "Someone will come for you." He watched while Brion placed the girl's still body in the shade, and passed over the vaede for the last time. Just before leaving he turned back, hesitating.

"My name is . . . Ulv," he said. Then he was gone.

Brion did what he could to make Lea comfortable, but it was very little. If she didn't get medical attention soon she would be dead. Dehydration and shock were uniting to destroy her.

TO BE CONTINUED

IN TIMES TO COME

James H. Schmitz is back next month—it should happen to us more often!—with a yarn titled "Lion Loose . . .". This "lion," however, is not a relative of the domestic cat, nor of anything earthly, but a zoological specimen from an alien world. Its size and carnivorous tendencies are its major resemblance to a lion. After all, real lions don't make nuisances of themselves on spaceships by walking through walls . . . and aren't so hard to catch and hold after you've caught them . . .

The Editor.

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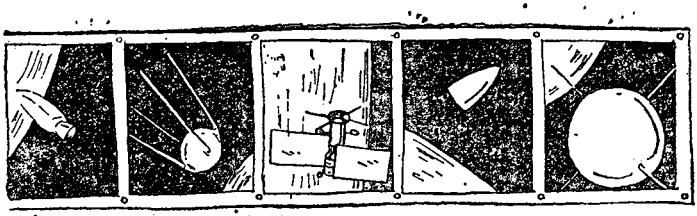

THEY ALSO SERVE

By DONALD E. WESTLAKE

Why should people hate vultures? After all, a vulture never kills anyone . . .

Illustrated by Douglas

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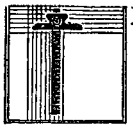

HE launch carrying the mail, supplies and replacements eased slowly in toward the base, keeping the bulk of the Moon between itself and Earth. Captain Ebor, seated at the controls, guided the ship to the rocky uneven ground with the easy carelessness of long practice, then cut the drive, got to his walking tentacles, and stretched. Donning his spacesuit, he left the ship to go over to the dome and meet Darquelnoy, the base commander.

An open ground-car was waiting for him beside the ship. The driver, encased in his spacesuit, crossed tentacles in a sloppy salute, and Ebor returned the gesture quite as sloppily. Here on the periphery, cast formalities were all but dispensed with.

Ebor stood for a moment and watched the unloading. The cargo crew, used to working in spacesuits, had one truck already half full. The replacements, unused to spacesuits and, in addition, awed and a bit startled by the bleakness of this satellite, were moving awkwardly down the ramp.

Satisfied that the unloading was proceeding smoothly, Ebor climbed aboard the ground-car, awkward in his suit, and settled back heavily in the seat to try to get used to gravity again. The gravity of this Moon was slight, of course—barely one-sixth the gravity of the Home World or most of the colonies—but it still took getting used to, after a long trip in free-fall.

The driver sat at the controls, and the car jerked into motion. Ebor, looking up, noticed for the first time that the dome wasn't there any more. The main dome, housing the staff and equipment of the base, just wasn't there.

And the driver, he now saw, was aiming the car toward the nearby crater wall. Extending two of his eyes till they almost touched the face-plate of his helmet, he could see activity at the base of the crater wall, and what looked like an air-lock entrance. He wondered what had caused the change, which had obviously been done at top speed. The last time he'd been here, not very long ago, the dome had still been intact, and there had been no hint of any impending move underground.

The driver steered the car into the open air lock, and they waited until the first cargo truck had lumbered in after them. Then the outer door closed, the pumps were turned on, and in a minute the red light flashed over the inner door. Ebor removed the spacesuit gratefully, left it in the car, and walked clumsily through the inner door into the new base.

A good job had been done on it, for all the speed. Rooms and corridors had been melted out of the rock, the floors had been carpeted, the walls painted, and the ceilings lined with light panels. All of the furnishings had been transferred here from the original dome, and the result looked, on the whole, quite livable. As livable as the dome had been, at least.

But the base commander, Darquel-

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noy, waiting for his old friend Ebor near the inner door of the lock, looked anything but happy with the arrangement. At Ebor's entrance, he raised a limp tentacle in weary greeting and said, "Come in, my friend, come in. Tell me the new jokes from home. I could use some cheering up."

"None worth telling," said Ebor. He looked around. "What's happened here?" he asked. "Why've you gone underground? Why do you need cheering up?"

Darquelnoy clicked his eyes in despair. "Those *things!*" he cried. "Those annoying little creatures on that blasted planet up there!"

Ebor repressed an amused ripple. He knew Darquelnoy well enough to know that the commander invariably overstated things. "What've they been up to, Dar?" he asked. "Come on, you can tell me over a hot cup of restno."

"I've been practically living on the stuff for the last two dren," said Darquelnoy hopelessly. "Well, I suppose another cup won't kill me. Come on to my quarters."

"I've worked up a fine thirst on the trip," Ebor told him.

The two walked down the long corridor together and Ebor said, "Well? What happened?"

"They came here," Darquelnoy told him simply. At Ebor's shocked look, he rippled in wan amusement and said, "Oh, it wasn't as bad as it might have been, I suppose. It was just that we had to rush around so frantically, unloading and dismantling the dome, getting this place ready—"

"What do you mean, they *came* here?" demanded Ebor.

"They are absolutely the worst creatures for secrecy in the entire galaxy!" exclaimed Darquelnoy in irritation. "Absolutely the worst."

"Then you've picked up at least one of their habits," Ebor told him. "Now stop talking in circles and tell me what happened."

"They built a spaceship, is the long and the short of it," Darquelnoy answered.

Ebor stopped in astonishment. "No!"

"Don't tell me no!" cried Darquelnoy. "I *saw* it!" He was obviously at his wit's end.

"It's unbelievable," said Ebor.

"I know," said Darquelnoy. He led the way into his quarters, motioned Ebor to a perch, and rang for his orderly. "It was just a little remote-controlled apparatus, of course," he said. "The fledgling attempt, you know. But it circled this Moon here, busily taking pictures, and went right back to the planet again, giving us all a terrible fright. There hadn't been the slightest indication they were planning anything *that* spectacular."

"None?" asked Ebor. "Not a hint?"

"Oh, they've been boasting about doing some such thing for ages," Darquelnoy told him. "But there was never any indication that they were finally serious about it. They have all sorts of military secrecy, of course, and so you never know a thing is

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going to happen until it does."

"Did they get a picture of the dome?"

"Thankfully, no. And before they had a chance to try again, I whipped everything underground."

"It must have been hectic," Ebor said sympathetically.

"It was," said Darquelnoy simply.

The orderly entered, Darquelnoy told him, "Two restno," and he left again.

"I can't imagine them making a spaceship," said Ebor thoughtfully. "I would have thought they'd have blown themselves up long before reaching that stage."

"I would have thought so, too," said Darquelnoy. "But there it is. At the moment, they've divided themselves into two camps—generally speaking, that is—and the two sides are trying like mad to outdo each other in everything. As a part of it, they're shooting all sorts of rubbish into space and crowing every time a piece of the other side's rubbish malfunctions."

"They could go on that way indefinitely," said Ebor.

"I know," said Darquelnoy gloomily. "And here we sit."

Ebor nodded, studying his friend. "You don't suppose this is all a waste of time, do you?" he asked, after a minute.

Darquelnoy shook a tentacle in negation. "Not at all, not at all. They'll get around to it, sooner or later. They're still boasting themselves into the proper frame of mind, that's all."

Ebor rippled in sympathetic amusement. "I imagine you sometimes wish you could give them a little prodding in the right direction," he said.

Darquelnoy fluttered his tentacles in horror, crying, "Don't even *think* of such a thing!"

"I know, I know," said Ebor hastily. "The laws—"

"Never mind the laws," snapped Darquelnoy. "I'm not even thinking about the laws. Frankly, if it would do any good, I might even consider breaking one or two of the laws, and the devil with my conditioning."

"You *are* upset," said Ebor at that.

"But if we were to interfere with those creatures up there," continued Darquelnoy, "interfere with them in any way at all, it would be absolutely disastrous."

The orderly returned at that point, with two steaming cups of restno. Darquelnoy and Ebor accepted the cups and the orderly left, making a sloppy tentacle-cross salute, which the two ignored.

"I wasn't talking necessarily about attacking them, you know," said Ebor, returning to the subject.

"Neither was I," Darquelnoy told him. "We wouldn't have to attack them. All we would have to do is let them know we're here. Not even *why* we're here, just the simple fact of our presence. That would be enough. *They* would attack *us*."

Ebor extended his eyes in surprise. "As vicious as all that?"

"Chilling," Darquelnoy told him. "Absolutely chilling."

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"Then I'm surprised they haven't blown themselves to pieces long before this."

"Oh, well," said Darquelnoy, "you see, they're cowards, too. They have to boast and brag and shout a while before they finally get to clawing and biting at one another."

Ebor waved a tentacle. "Don't make it so vivid."

"Sorry," apologized Darquelnoy. He drained his cup of restno. "Out here," he said, "living next door to the little beasts day after day, one begins to lose one's sensibilities."

"It has been a long time," agreed Ebor.

"Longer than we had originally anticipated," Darquelnoy said frankly. "We've been ready to move in for I don't know how long. And instead we just sit here and wait. Which isn't good for morale, either."

"No, I don't imagine it is."

"There's already a theory among some of the workmen that the blow-up just isn't going to happen, ever. And since that ship went circling by, of course, morale has hit a new low."

"It would have been nasty if they'd spotted you," said Ebor.

"Nasty?" echoed Darquelnoy. "Catastrophic, you mean. All that crowd up there needs is an enemy, and it doesn't much matter to them who that enemy is. If they were to suspect that we were here, they'd forget their own little squabbles at once and start killing us instead. And that, of course, would mean that they'd be united, for the first time in their history, and who knows how long it would take them before they'd get back to killing one another again."

"Well," said Ebor, "you're underground now. And it can't possibly take them *too* much longer."

"One wouldn't think so," agreed Darquelnoy. "In a way," he added, "that spaceship was a hopeful sign. It means that they'll be sending a manned ship along pretty soon, and that should do the trick. As soon as one side has a base on the Moon, the other side is bound to get things started."

"A relief for you, eh?" said Ebor.

"You know," said Darquelnoy thoughtfully, "I can't help thinking I was born in the wrong age. All this scrabbling around, searching everywhere for suitable planets. Back when the Universe was younger, there were lots and lots of planets to colonize. Now the old problem of half-life is taking its toll, and we can't even hope to keep up with the birth rate any more. If it weren't for the occasional planet like that one up there, I don't know what we'd do."

"Don't worry," Ebor told him. "They'll have their atomic war pretty soon, and leave us a nice high-radiation planet to colonize."

"I certainly hope it's soon," said Darquelnoy. "This waiting gets on one's nerves." He rang for the orderly.

THE END

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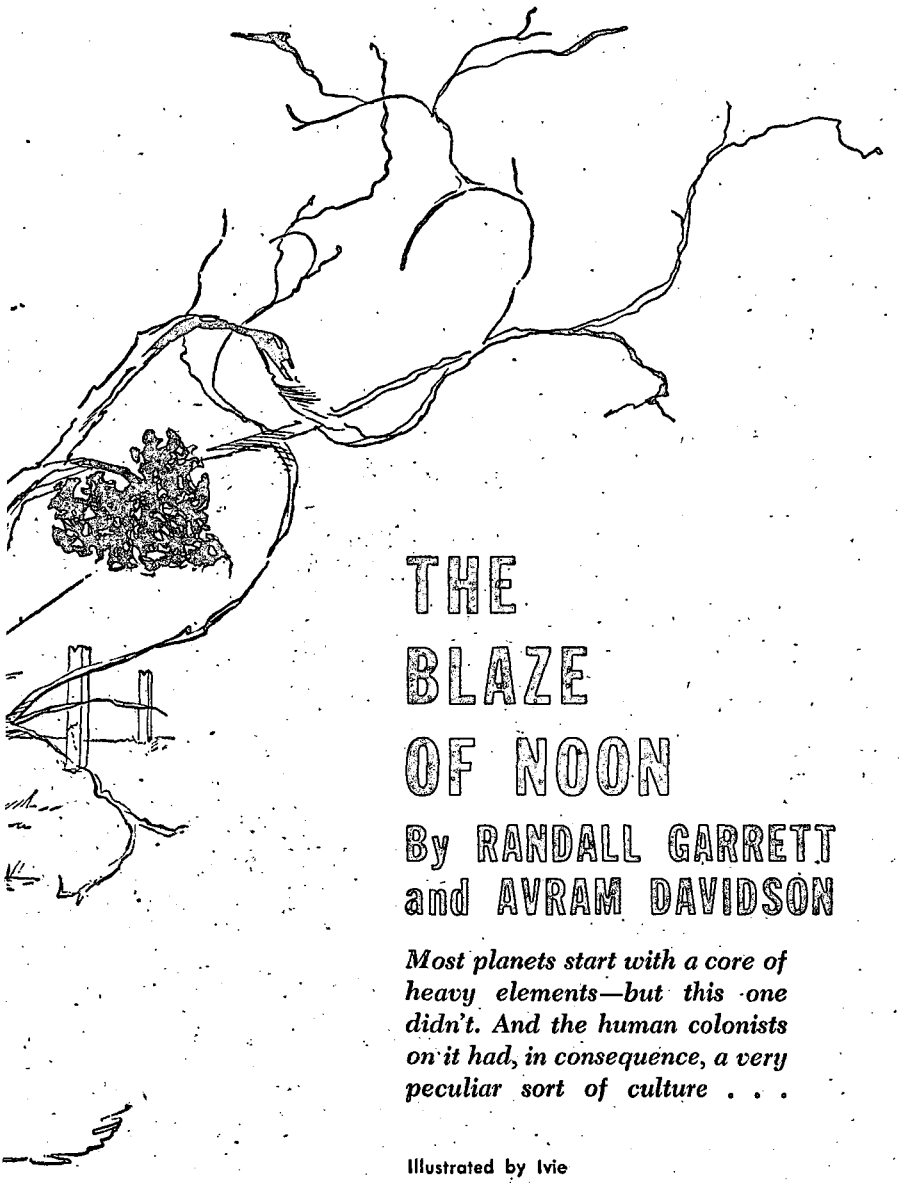

THE BLAZE OF NOON

By RANDALL GARRETT and AVRAM DAVIDSON

Most planets start with a core of heavy elements—but this one didn't. And the human colonists on it had, in consequence, a very peculiar sort of culture . . .

Illustrated by Ivie

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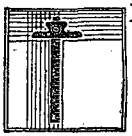
"Oh, dark, dark, dark, amid the blaze of noon . . ."
—Milton: *Sampson Agonistes*



THE "forming platform" had gone long ago, but the place where it had stood was still studded by the truncated abutments upon which the great grid had once been erected. The area might long since have been swallowed up in high grass and its vast pillars shattered and pushed aside by upthrusting trees, but sheep were grazing there now, and they kept the vegetation down to a series of green reticulations. The ground sloped gently on all sides toward a square basin near one edge, which was lined with moss-covered stone. Reeds grew thickly along its sides, for the basin had become a pond whose water level varied with the seasons.

At the moment, it was rather low. It only came to the knees of the man who stood in the middle of it, a heavy case in each hand, swearing angrily in a low voice.

Gardel, the herd-boy—shock-headed, dirty-faced—had heard the sudden splash and had looked around. He wondered why the man had chosen to jump into the middle of the pond, muddying up the water for his sheep. He started down the slope toward the newcomer. His look changed from annoyance to surprise, and almost to alarm, the closer he came. Finally he stopped, a good ways off, and stood watching, tensed for flight.

The man in the pond, whose name was Gail'sson Bayer Tad, stopped swearing. He called over to the boy: "Is it this shallow all around? Can I just go on walking out? How about giving me a hand? *You* won't get your clothes dirty!"

And it was true that the boy's ragged shorts only came partly to mid-thigh.

"Wh'are ya, Mestor?" the boy asked, his voice uncertain. "What's it ya do's ere?"

The man in the pond grimaced. "What an entrance!" he complained. A sudden grin spread over his face. "*Do?* What I'm *supposed* to do—what I've come here to Hogarth's for. —I'm supposed to build the Grid again. You know what I'm talking about? Fixee Grid? Or—"

Under his dirt and tan, the boy went red. He took a step forward. Then excitement gave way to awe—he stopped—to fear. Face awry, he turned and fled up the slope.

The man in the pond yelled to him to come back. Then: "Hey! This *is* Hogarth's Planet, isn't it?" Presently the boy, never stopping nor looking back, vanished over the brow of the nearby hill. The man in the pond began to swear once more.

Life on well-ordered Sirius V had scarcely prepared Gail'sson Bayer Tad for splashing about in the watery muck and slime of country pools. Even the stinks on this planet were different from those he was used to. He made his way across to the bank very gingerly, holding the heavy plastic cases out of the water. Not, he

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thought wryly, that a little water would hurt them; the one in his left had contained personal belongings and small pieces of equipment, the other contained his powerpack, and both of them were waterproof, but he held them up as a matter of principle.

He squelched up the slope to the crest and looked around.

He hadn't known exactly what he'd expected to see. The garden-surrounded villas and pleasure-domes which had once characterized the settled parts of Hogarth's Planet? Or their ruins, perhaps, still smoking?

Smoke there was, a good distance away to the east of him, its source concealed behind low, rolling hills. Trees, singly and in clumps, with grayish, mottled trunks, and big, lacy leaves, like gray-green doilies, stood out oddly against the bright green of the grass. Here and there were other irregular patches of gray vegetation —alien life forms contrasting with the familiar green of Earth-type plants.

He saw something that looked like an archaic beehive magnified several times—the shepherd's hut, he guessed. As he topped the rise, a dog gave a yowling bark but didn't approach. Near the hut, he saw the boy talking to an older man, one outstretched arm pointing in Tad's direction.

Both of them were staring at him. Tad lowered one of the cases to the ground and waved at them, but they simply continued to stare. He set the other case down and flexed his fingers. They were *heavy*! Then he sat down on the power-pack and waited. Let them come to him. He had a feeling that if he went towards them they'd simply retreat.

After a minute or two of speculative conversation, the two began to walk slowly toward him. Tad just sat quietly. As they came closer, Tad saw that the long staff he had seen the man pick up was not, as he had first assumed, a shepherd's crook; it was a spear, tipped with a tapering, wicked-looking point of bone, stone, or shell. Suddenly, the weight of the heavy gun beneath his left armpit was very comforting. It would take but a fraction of a second to reach into his jacket, draw, and fire.

A pair of fiercely ugly dogs, unlike any breed Tad had ever seen before, trotted along beside the pair. One of them began yapping loudly. The boy picked up a small stone and shied it at the animal's flank. "Sharrup, Bogey!" The dog yelped and went silent. The man was gaunt and bony, and a thin patina of dirt clung to his skin, looking as though it had established its right to be there by long occupation. He wore more clothes than the boy, but they were just as ragged—trousers, shirt, cape, a broad-brimmed leather hat, a sporran, a shell knife. One eye-socket gaped red and empty. His mouth, too, gaped, but it was filled with the broken, blackened stumps of teeth. He stopped and blinked his one good eye. Then, word for word, he repeated the boy's question.

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"Wh'are ya, Mestor? What's it ya do's ere?" Then he added: "It's Robard's land ya's on, ya knows. He's Grammestor ere, and ya musts no be ere less'n e permits."

The boy interrupted with a sudden flow of words, of which Tad got only ". . . Grammestor issame says, tis not issame place ere—Gridland oly and common'eld—some'at like a smithy . . ."

"Um, um," said the oldster. "But this be's no Gridland up on the ill ere." He looked back at Tad and asked for the third time, "Wh'are ya?"

"My name is Gail'sson Bayer Tad," he said evenly.

The man looked puzzled. "All that? Ya's a worshipful?"

"Dress like one," the boy said in awed tones. "And *metal!*" He was eying the watch on Tad's wrist.

Tad didn't feel like either confirming or denying a question he didn't understand. "I've come from Sirius V, to—" he began.

"*Sir'us?*" The oldster's ravaged face quickened. "Eard tolds a that place. Ya's fro' near Earth, Mestor—ya says?" Suspicion began to cloud the single eye even as acceptance almost won out.

"Near there," Tad said. After all, what was nine light-years in comparison to the distance between the Terran Hegemony and Hogarth's Planet?

"And ya's rich, too," the boy said.

"Well, no; I—"

"Ye', Mestor," said the old shepherd, "ya's rich. Or be's it true what th' old tales told say . . . 'In th' Old Worlds even the poor ones gots metal'?"

"Why, of course," Tad said.

"*Ah!*" The shepherd and the boy looked at each other, then back at Tad. The old man's mouth was all but drooling. "Ya musts go's ta Robard, Mestor."

"Na, na," the boy said quickly. "Ifs I tolds Robard, Grammestor's comes ere to Mestor."

"Um," said the oldster. "Go's tells. Runs!"

The boy took off without another word, his bare feet hardly seeming to touch the grass as he ran.

"E be's back quick," the old shepherd said, taking a firmer grip on his spear. His voice became almost obsequious. "Would'a like t' ave a bit a bread? Or some smoke-meat? Or I gots some nice cool clabber-milk down to the shack." He gestured toward the giant beehive.

"No, thanks," Tad said. "I just ate." It was true—besides which, he didn't think he wanted to eat anything this grimy old serf had prepared. And, too, he had a sneaking hunch that the old shepherd had designs on the wristwatch or perhaps the other metal in his clothing. He kept his right hand near his gun and waited warily.

It was half an hour before anyone showed up, although it seemed more like two hours to Gail'sson Bayer Tad, who had spent it in a question-and-answer fencing duel with the old shepherd. Then, in the distance, he heard a muffled thudding, and, look-

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ing up, he saw four animals and their riders coming over the hill from the direction in which the boy had disappeared.

For a few startled seconds, he didn't even look at the men on the beasts; he was too busy looking at the beasts themselves.

At first he had thought they were bears; they were shaggy, and their gait was similar to that of a bear running on all fours. But the head was totally unbearlike. It was earless and long—much longer, even, than a horse's, in comparison with the body—and it was attached to the end of a long, shaggy neck. The teeth were the long, flat-topped grinding teeth of the herbivore, and the feet had blunt nails, rather like those of an elephant.

By the time Tad had shifted his attention to the men, the group had come quite close. He noticed, out of the corner of his eye, that the shepherd had doffed his floppy leather hat and was standing with his head bowed respectfully. The leader of the group, whom Tad supposed to be the Grammestor Robard, ignored the shepherd.

At a distance, the men had appeared to be magnificently clad. Their clothes were brightly colored and extravagantly cut in a style Tad had never seen before. But, as they drew closer, he could see that the magnificence was more than slightly soiled. Grease stains showed on Robard's shirt of fine red wool, and the cuffs of the trousers were muddied. His sandal-clad feet were dirty. On his head was a tall, lambskin hat, and around his neck hung a chain of either brass or gold—Tad couldn't tell which.

There was a metal knife thrust into the broad belt, and the grease from the blade had stained the cloth. His left hand grasped a metal-tipped spear, while his right held the reins that guided the alien beast.

Robard himself might have been handsome if he had been younger and had been brought up on a world which was kinder to human beings. But the eyes beneath his broad forehead were red and puffy, and his lips were dry and chapped. When he spoke, he showed that his teeth were in better condition than those of the old shepherd—but only slightly so. His tongue seemed gray and swollen. It was obvious that the Department of Public Health on Hogarth's Planet had been defunct for a long time. The others of the entourage looked no better.

Tad hoped prayerfully that the immunization he'd undergone on Sirius V was as thorough as it was supposed to be.

Grammestor Robard leaned forward on his mount and peered at Tad. "Ya's fro' Sirius—boy says ya tolds?" He emphasized the second syllable as if to show that *he* was no ignorant serf. "How's it ya fro' Sirius when the Great Grid's gone?" When he said "Great Grid," he and the other men made an odd gesture with their right hands. "Ya's not got up like men fro' Yarkrite, here—nor like what's told of way they gets sames up on other islands. True. But tell me

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how's it ya gets here fro' Sirius?"

Since Robard hadn't bothered with any introduction, Tad didn't either. "I didn't need the whole Grid. It took a lot of power, and a lot of careful computation, just to get *me* through, but there was enough of the Grid left to do it."

Without another word, Robard stood up in the stirrups of his mount and looked down at the expanse of grass where the huge grid had once been. He looked for a long time, it seemed, then he lowered himself, scowling, back into the saddle. "I sees no Grid," he said flatly.

"Of course not," Tad said. "It's buried. The main part of the Grid was up on those pillars, ten feet above the ground. But that square pit, there, where the pond is now, was the pit for an elevator. The platform is raised by a piston from underneath, and it fit into the rest of the Grid when it was raised. But it's buried under the mud at the bottom of that pit now."

Robard smacked his thigh with a heavy hand. "Son of an orse! Under the pond! Been there all these underdyears! High Ram!" A sudden idea silenced his boisterous outburst. He turned to the other men and said threateningly. "Any man tells a this, by High Ram, I's 'pales 'im! Ya hears?" They nodded silently.

He turned to Tad, his face taking on an expression which he presumably thought to be that of a gracious host. "Ya musts comes wi' me, guest-fella. Milk and honey we gives ya, hot meat, honor seat at table, and clean fleece on the bench! Not a Grammestor in Yarkrite gives better guesting than Robard. Come! My own sister's eldest son, my bonded heir, gives ya is orse and leads the beast by bridle. Eh, Soby?"

Soby, a younger, rather hard-faced man, climbed off his mount wordlessly and held the reins for leading.

"You, Edder! Grabs the Mestor's pack-boxes or whatever they be's and gets 'em on ya's orse."

Tad didn't want to let the equipment out of his hands, but he couldn't see what he could do about it. Keep an eye on 'em and keep a hand near the gun, he decided. He climbed aboard Soby's orse, and the procession moved off.

Robard leaned over and hissed into Tad's ear: "Build Great Grid again, ya says! Later, we talks a that, and a what elp there be's for the widow's son." And his eyes fell greedily to Tad's wristwatch, dagger, and belt buckle.

Grammestor Robard's place was not, as Tad had assumed it would be, a single house. It was part fort, part encampment, with outer walls of mortared brick and fieldstone, surrounding an open area in which were scattered, higgledy-piggledy, houses of logs or roughly hewn timber, with turf roofs, tents of cloth or skin, and a multitude of brushwood huts. There were two low hills, each crowned with walls of fieldstone.

The party rode on past the first of the low hills, and, as they did, the men doffed their hats. Robard no-

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ticed Tad's look. "Smithy," he said, replacing his hat. Tad, unsure of what he should do, belatedly bobbed his head toward the enclosure. There was a certain relaxation all around as he did so.

It figured. Hogarth's Planet had a crust which was very deficient in heavy metals, and what little there was had been eroded from its major pockets aeons ago by the wash of the great sea that covered eighty per cent of the planet's surface. That was, in fact, the main reason why it had been selected for this particular phase of Project Retouch. If the Hegemonic Government could be convinced that even a planet so poor in natural resources as Hogarth's could rebuild its Grid from locally available materials, it would probably loosen up the purse strings for further reopening of the planets which had been cut off during the Rebellion.

That also explained the covetous, envious stares that had been directed at every metal object he carried. It explained the lack of metal, even among the armed men—spears tipped with bone or shell. It explained the shepherd's half question: "On th' Old Worlds even the poor ones gots metal?"

Under such conditions, it was no wonder that a smithy received the reverence due a holy place. And hadn't he read or heard somewhere that on Earth itself, in ancient times, there were places where the ironworkers were priests as well?

The village, if such it could be called, stank, but the stench seemed to bother no one but himself. Robard certainly showed no sign of thinking his capital lacked anything, from the way he peered, with sly pride manifest, from the corners of his swollen red eyes. And when Tad observed diplomatically, "This is quite a place you've got here, Grammestor," the man smirked and threw out his chest and gazed about complacently.

As they came to the second hill, with its high enclosure of rough mortared fieldstone, a sort of guard emerged hastily from a narrow doorway, saluted and stood at attention. The door itself, obviously operated by overhead pulleys, slid upward into a slit in the wall. The nobles ignored the salute, and Tad simply held his head high.

The doorway was just wide enough for one mounted man at a time to ride through; the party had to go single file. Inside, they followed a narrow passage that turned twice at right angles. In the roof overhead, small holes, hardly larger than a man's head, let in enough light to see by.

The reason for the traplike passageway was obvious. Without metal, it was impossible to build a door that could be both fireproof and easily maneuvered. If the place were besieged, the door could be burnt down or smashed in. But the besiegers would still have to come through that trap passage slowly, one at a time. And those holes overhead would admit more than just light; boiling water or burning oil or arrow shafts could go through them as well. You could feed an army into a trap like

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that without getting a single man through.

Inside, after the small party had emerged from the tunnellike corridor, they came into an open courtyard. In the center of it, looking oddly out of place in its primitive surroundings, stood a long building of poured concrete which Tad recognized at once as a workers' barracks typical of the period when Hogarth's was first settled. The usual corrugated aluminum roof was missing, however, replaced by one of tiles, mossy and blackened with age. Here and there a tile was lacking, and the gaps had been covered by slabs of wood, each with a stone on top to keep it from being carried away by the wind.

Outbuildings of all sorts had been added to the concrete barracks, and the marks of fire were on the walls. No one had said anything, but the military trappings and fortifications convinced Tad that the fire had not been a peaceful one.

Hogarth's Planet had once been peaceful, Tad knew from his study of the planet's history up to the Rebellion. In the early days, its lack of heavy metals had turned it into a "pleasure planet." Here, unvexed by the sights, sounds, smells, and turmoil of heavy industry, the wealthy and the retired, and those who attended upon them, lived an easy exurban existence.

The planet certainly wasn't good for much else. Its lack of heavy metals made it useless for mining or industry, and the native life forms, with their magnesium-based blood and alien metabolisms, weren't commercially useful. Even the staple foods, such as grain, vegetables, and meat, could be grown on the planet only after its soil had been thoroughly enriched with fertilizers containing iron and other trace elements necessary for the metabolism of earth-type organisms.

Hogarth's Planet was old—fantastically old. When the planets of Sol were still dispersed dust motes in a collapsing, eddying cloud, Hogarth's Planet was already billions of years old. Such planets were rare—so rare that it was likely that no more than two such systems existed in the entire galaxy.

When the vast gas cloud that was to become the galaxy began to coalesce into stars, only one element existed—hydrogen. There were no planets born of that coalescence because there was nothing to form them of—hydrogen is too light to form and maintain a mass of planetary size in the vicinity of a radiating sun. It can only form suns. And those suns became the cooking-pots for the elements as the thermonuclear reactions in their interiors built up the nuclei of the denser elements.

Eventually, after millions or billions of years of cooking, the nucleus of such a star becomes loaded with heavy elements—mostly iron-56. And then, in a short half hour, it goes supernova, scattering its substance across billions of cubic light-years in one tremendous, self-destroying explosion. And, after more billions of

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years, those dust clouds again coalesce, producing "second generation" suns and their families of planets—for now the elements exist.

But Hogarth's Planet, like MacDuff, had been ripped untimely from its mother's womb.

Two of those primal stars, their interiors only partially cooked towards the heavier elements, and nowhere near the supernova stage, had that accident that is so rare among stars—a direct, head-on collision or something very close to it. The resultant explosion was supernova in violence if not in mechanism. From the resulting cloud of dust, containing only a smattering of elements heavier than vanadium-51, the sun and system to which Hogarth's Planet belonged had been formed.

Hogarth's Planet was more than two and a half times as massive as Earth, but, with a density only sixty-two per cent as great, its diameter was on the order of twelve thousand seven hundred miles, giving it a surface gravity within one per cent of Earth's, and a surface area nearly two and a half times that of Earth.

There had been no vulcanism on the planet for billions of years; without the radioactivity of heavy elements to keep it warm, the core gradually cooled. Mountain-building had ceased long ago, and the tides, rains, and winds had done their erosive work on the land surface, so that now the only land projecting above the surface of the sea was composed of islands and island chains totaling less than a quarter of Earth's land area.

Since the gravitational gradient was not as great as that of Earth, the planet had once held a much deeper, denser atmosphere, but it had lost much of that through the aeons, and now it was only a little denser than that of Earth.

Had there ever been intelligent life indigenous to Hogarth's Planet? Possibly, but no trace had ever been found. Such a race could have evolved, hit its zenith, and passed into senility and oblivion by the time the first half-living protoviruses were still being formed in the organic soup of Earth's seas.

For the people of the Hegemony, it was obviously not suited for anything but a garden spot to retire to when one had finally socked away enough millions to be able to afford it. And then, too, there had been a few paleontologists, geologists, and theoretical astrophysicists who were interested in the history of Hogarth's Planet.

Earth-type plants and animals had been imported, and here, as on many other planets, had acclimatized themselves and now shared the planet with the local flora and fauna, which, because of their alien metabolism, were inedible to Terran organisms. Once the forests had been seeded with the proper sort of grass, deer had been released in them, flourished, and been hunted. The island-studded seas were parted by the hulls of yachts and smaller pleasure craft. The Grid itself had been set up on the prosaically-named First Island—which the inhabitants had, for some mysterious

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reason, renamed Yarkrite—which was about the size of New Zealand's three islands combined. True, the cost of matter transmission was high, but, aside from metals, only luxury items came in, and those who could afford to live on Hogarth's could afford the toll.

And then had come the Debacle, the Deluge, the Crash, the Insurrection, the Rebellion—call it what you will. The teeming, swarming, boisterous, take-no-nonsense-from-the-Old-Worlds-Hegemony colonies had burst into flame, into open rebellion. Their demands for autonomy, higher prices for their raw materials, and lower prices on the manufactured goods they imported, had all been refused. So they had turned their Grids into troop-launching platforms and had poured armed men—raging and spoiling—into the older planets.

At first, they were fantastically successful. On the staid, settled worlds of the Hegemony—the planets of Sol, Procyon, Sirius, Alpha Centauri, and the others within a score of light-years of Sol—no one had actually thought that armed men would suddenly appear in the matter transmitters where tons of cargo had been expected. And, one after another, the transmitters had fallen under the carefully-timed, almost simultaneous onslaught from the discontented colony worlds.

But the advantage they had was only an apparent one. Within a short time, the transmitters had been retaken when it was possible and blasted into plasma by a thermonuclear bomb when it was not. Cut off from supplies and vastly outnumbered and underweaponed, the colonial troops were soon mopped up.

And the transmitters to the outer

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worlds, once shut off, remained shut off. The shock and fear had caused a reaction in the minds of the people of the Hegemony: Cut off the Outer Worlds! *All* of them! No exceptions! Not even for Hogarth's Planet, certainly as eager to maintain the *status quo* as any of the Old Worlds. Nor for any of the other innocent planets that were cut off, willy-nilly, the good along with the bad.

And, since the colonial planets had no transmitters, only the pickup and receiving Grids, and no technicians or scientists who could build transmitters, the cut-off became permanent.

That had been three hundred years ago, and now Tad was seeing the results.

Old Robard did, indeed, offer Tad milk and honey. Tad barely licked at either. A woman came to the table where they were all seated in the main hall and washed their feet—a ceremony which Robard from appearances, generally skipped on his own account. Hot meat was soon prepared: grilled lamb. A stew of dried fruits served for dessert, and a sort of raw brandy to finish off with. The old man got quickly, quietly drunk, in a controlled sort of way. Some of the others—masters of flocks and lands held under the Grammestor, who were on hand by the accident of coming to court for business—elder sons of these, doing guard duty—younger ones, supposedly learning manners and the use of arms—were not so careful. Or perhaps simply not so experienced with brandy.

Robard's two nephews sat next to him, two villainous young men with long, blue chins. The nearer, Soby, paused in his whooping and hollering to blow his powerful breath in Tad's face. "Ya brings us metal, eh, guest-fella?" he shouted.

"Well—"

"Ya owes it to us! Three under-dyear—orse-son!"

On a sudden, angry impulse, Tad said, "Do they curse guest-fellows at Robard's table?"

The old Grammestor turned his head at this and suddenly dashed the contents of his cup in Soby's face. "Kiss hand, ha *baghan*!"

Tad didn't know the word, but the nephew did. He winced, sobered somewhat, pressed his wet lips to Tad's hand before it could be pulled back, and muttered apologies in a fawning tone. Tad grunted and turned away, but the nephew tugged at his sleeve with fingernails as long and dark as his chin.

"I gots twenty pigs, ya knows," he gobbled, mouth twisting with satisfaction.

Tad didn't show his surprise at Soby's sudden about-face. "Oh? Fat ones, are they? Sheep, too, I supp—"

"*Uh?*" A scowl, quickly replaced by an obsequious leer. "Ya laughs, guest-fella! Ya be's a jolly one! But ya knows I means pigs a iron. Twenty of'm, I gots. My bond, posteds in th' treasure-ole by High Grammestor's Ouse, ta Greatbay City. Says true. Bonded heir ta th' old Grammestor, and I be's richer nor e. Be's another

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wh' asked th' heirship, the orse-son —" He darted an ugly look a his brother, Edder, who was yowling into his mug of drink. "But e coulds posts no bond. Twenty pigs, ya hears? Don'ts I gives the Teller's-man ta th' treasure-ole a copper-bit or some'at ta keep th' pigs slick? Grease keeps the rust off. Twenty pigs, true. Old Mom gives 'em ta me, bond-posts time. Er dowry, ya knows."

Impressed by this odd tale of mother-love for such an unlovable object, Tad asked, "Where's your Old Mom now?"

"Croakeds," said the heir and magnate, indifferently. He drank.

Old Robard hadn't been saying much, and the others were, for the most part, too awe-stricken—or too drunk—or both—to do more than stare at Tad and then glance quickly away if they met his eye. Robard's own eyes kept straying to the dagger in its ornamented sheath at Tad's belt. The amusement Tad felt was tempered by the thought that his own culture had reverted to the ancient mores in some ways, too, since the dagger was the symbol of his rank as a Technician *Beta*-Fourth.

Yielding to temptation and brandy, he stood up and said in a clear voice: "Noble Grammestor Robard, I wish to show my appreciation for the welcome you have given me and the honor you have bestowed upon me."

Robard blinked drunkenly for a few seconds, then ponderously rose to the occasion.

Before he could say anything however, Tad, with all eyes upon him, unclipped the dagger and sheath from his belt and proffered it to the Grammestor.

"Noble Grammestor, please accept this gift as a token of my esteem for you and those who follow you loyally."

Robard, showing almost superhuman restraint, took the sheathed blade slowly and reverently. Then he grasped the hilt and withdrew the dagger from its scabbard. The stainless steel blade gleamed silvery.

At that moment, Tad could undoubtedly have deposed the bonded heir, twenty pigs or no twenty pigs.

"Ya sees this?" cried Robard suddenly, kicking his nearest table-mate into sobriety and wakefulness. "Ya knows what this be's? *Steel*, ya hears? None a ya's rustin' iron or pishy green copper! This be's what ya calls *metal*! Look, ya orse-sons! *Steel*!"

And they looked, shocked almost into violence, envious and awed.

Robard turned and embraced Tad. "Ah, High Mestor, now I knows ta true that ya comes fro' th' Old Worlds!" Tears poured from his red eyes, making them redder. The gray, swollen tongue popped in and out of his mouth like a toad in a hole. "The' be's no trickery ere! No' in any land on Ogarth lives a man who's gives away proper metal, who's gives away *steel!* Our faith-keepin's no' for naught! Great Grid sha' be rebuilt! I sha' sees it a standin', may the Grand Artisan a the Universe spares me!"

Tad felt that this was a propitious moment if ever one could be found. "I'll do my best to bring that very

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thing about, Noble Grammestor," he promised. "But I'll need help."

That succeeded in bringing the Grammestor more or less out of his ecstasy. "Tells us," he pleaded, "tells us, Worshipful, what musts we do?"

"Oh, not a great deal. I'll need a few strong men and some good orses for the heavy work. I'll need sea salt and a few other things—not much. And as soon as the Grid is rebuilt again, all new, then Earth and the other Old Worlds will begin shipping in tools, machinery, medicines—thing like that—to help you."

"Metal . . ." Old Robard nodded and smiled and wagged his head. He licked dry lips with an ugly tongue and beat on the floor with his staff. "*Met—tal-l-l . . .*"

Tad was very sleepy. The room in the "palace" to which he was shown, had evidently lodged, until that moment, some semi-morganatic consort of the Grammestor. A clean blanket was thrown on the bed, more as ritual gesture than anything else, and an earthenware ewer of water put in its basin on the chest next to it. He set up an alarm system, and was almost at once in bed.

He had some dim, confused notion that he had been briefly and partially awake during the night; that a strange voice, a deep voice, was saying, "No forge on Ogarth makes this dagger, true. Be's proper Old Work. High Ram! But why was I not tolds? Not summoneds?" But when he woke up, he thought it was a dream, and promptly forgot it.

The breakfast was an odd one, certainly. He had never before begun the day on the soup of a hen cooked with its own unshelled eggs. And some rude attempts had been made at preparing fancy pastry, sticky with honey, and oozing sweet, soft cheese. Old Robard dunked . . .

Then, mouth half-filled, beaming, he said, "Worshipful, I brings ya proper thanks for ya gifts of much metal. May ya's iron never rusts, and ya girls bears mostly boys!"

It was evidently a ritual phrase, and so Tad replied with another, out of his own culture. "I receive with felicity these assurances of Your Excellency's good will, and regret only that the dagger was of such palpably poor quality that naught but Your Excellency's innate nobility prevents his mentioning it."

After a moment, Robard having ingested this—and half a bowl of breakfast soup, into which he had rather messily dropped a pastry—the old man said, "Time for proper thanks for dagger be's last night, Worshipful; orse-son, mysame, for forgetting," then. Gives thanks now for bit of Great Grid we digs up fro' Pond, a slab o copper big as an orse, may m' Worshipful's iron never rust! 'Pale me, if it melts out to less nor eighty, eighty-two pigs. Ha, ha!" He laughed in the fullness of his joy, soup and honey glistening wetly on his bristly chin.

Tad swallowed hard. "Grammestor, do you really mean—"

A gurgling laugh. "Three underdyear she lays there! Waits for Ro-

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bard! Metal! Ya names any Grammestor gots more, now, nor me? Orse-son Arnat? Leaves e boasts issame now, child a cheats that e be's. Ow clean she cuts—beauty metal!"

"Grammestor, you actually—you dug up that single piece of the Grid and *cut*—you cut it up? You're melting it down—"

A curious look came over Robard's face, like that of a child about to be faced with deserved punishment, but sure it can—and will—be avoided.

"Na, High Worshipful, I asks: Ya tolds all at table that ya comes fro' Sirius ta builds a new Great Grid. Tolds so ya'same? Wha' for ya musts gots bit of old one, then? Nought ta ya'same, metal. Old Worlds be's all rich wi' metal, ya *gives* it away, true?" And so on. Finally Tad stopped him, assured him it would be all right.

True, communication with Sirius V and the rest of the Hegemony would be cut off until he rebuilt the Grid, since his communicator depended on the Grid for relaying the beam across the vast distances between the stars. The old man's greed also cut off his only means of escape if things happened to get out of hand for any reason, on Hogarth's Planet.

Well, there was nothing he could do about it now. Order the Grid piece to be restored, reworked? Something told him that old Robard would bury his wives alive with a lot less fuss than he would surrender any piece of metal he'd once gotten hold of. On the other hand, if he left things be, the old man's gratitude could be useful.

"I only meant that I'd needed to use the old Grid piece for a month or so; I wanted you to have it as soon as I was done with it. But it isn't really essential. I'm glad you have been able to increase your own wealth of metal so tremendously."

A satisfied grin which almost closed the rheumy eyes. "Um. True, I gots ta gives tithe ta High Grammestor, but that helps ya ta gets his permission: Ya needs that for the Grid work, building new one."

"*His* permission? I thought I only needed yours."

"Ya *has* that. But ya saids ya needed sea salt, true?"

"True."

"See, I hasn't gots much salt on m' own lands, and since I gots no sea coast— If I had my rights—but Arnat's grandsir, the *baghan*—" He brought himself to a halt and reformed his thoughts. "So sea salt be's out. Now: Gridland be's common-'eld, true? Great Grid be's for all, true? Grammestor's who gots much sea salt, then, they musts not ta speaks a pay or due. But they *sha'* speaks of it, the orse-sons—less'n High Grammestor do's order they musts t'elp. Then they musts."

He frowned, sucked at his dry underlip. "I gots a proper saltlick a ways fro' ere. Be's any good?"

Tad thought about it. It would depend entirely upon the magnesium content of the salt, and it wasn't likely to be high in a rock salt deposit.

"We'll have to test it," he said at last. "But we'd better try to get sea salt if we can. Meanwhile, I'll do a

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little prospecting around here to see if some of the other rocks contain the metals I need."

Robard looked astounded. "Ya gets metal out a *rocks*?"

"It's possible, but it takes a lot of processing to get the stuff into solution. I'd rather work with sea salt."

"Um. Umm—"

"When can we see the High Grammestor, then?"

"Oh, I sends a rider out with message last night. Be's back in three, maybe four days, with summons ta come ta Greatbay City ta sees High Grammestor. Then we rides."

The idea of spending nearly two days on the back of a seasick-riding orse didn't appeal to Tad at all, but, again, there was nothing he could do about it. "When with a Vegan, be vague," he quoted to himself.

Old Robard slipped a hand under lambskin cap and polished his head. "Gots a question. Always kepts faith, ya sees, but never understands *this*—"

"Go ahead."

"Like so: If ya can't go t' other stars if ya gots no Grid, how does ya gets the Grid there in the *first* place?"

Oh, Son of Procyon! How was he going to explain *that* one? Still, it was an honest question, honestly asked, so he had to try.

"Well, the first Grid has to be carried to a new planet in a spaceship. A—oh . . . A starship, call it. I know, you aren't the only one who never heard of such a thing. Lots of people on the Old Worlds never heard of a space . . . a starship. We haven't even built any for centuries. For underdyears. Don't need them, once you get a transmitter and Grid established.

"You see, Grammestor Robard, a starship simply won't travel any faster than the velocity—than the speed—of light. Why? Uh, well—Well, look, a man can't run as fast as an orse, can he? Why not? Exactly. Because he just *can't*, that's all. A man can only run so fast and no faster. Same way with a starship; it can only go so fast and not any faster."

Robard nodded slowly.

"Now, if you had to go from planet to planet in a starship," Tad continued, "it would take years—underdyears, even—to get from one star to another. A man would die of old age long before he got where he was going. Travel through the Grid system is easier, safer, faster." He did not mention—in fact, barely remembered—that at the very first, matter transmission had been no safer than air travel. More than one group of pioneers, owing to infinitesimal errors in Grid co-ordinates, had been plummeted into deep space, there to die in an instant of time so brief there was no word for it, blood frozen crystaline on their unastonished faces. But people continued to try it, as their ancestors had continued to fly. And in time the dangers had disappeared.

Tad continued. "But, as you say, you have to get the Grid to the planet before you can go there yourself.

"Suppose, for instance, you were

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going to a star twenty-five light-years away. It will take a starship twenty-five years to get there. But, since there's no Grid, that's the only way you can go. Only you don't go yourself; you send a machine in a starship—a robot, it's called; an automatic machine that just sits in that ship for twenty-five years and does nothing. Then, when the starship gets there, the robot automatically lays down a very small Grid. It can't build a very big one, because you can't put much material into that kind of a starship, but it can build one that's big enough to begin with."

Robard's head wagged steadily; every time Tad said "machine," the Grammestor's eyes went to Tad's wrist watch.

"Now—through that little Grid you can send material for the robot to make a little bigger Grid. Then you send more material—"

The rufous eyes left the watch, focused on Tad's face. "Worshipful. What's it ya means, 'material'?"

"Metal."

Almost instantaneous understanding. Quick, rapid little nods of the head. No danger of wandering attention.

"Pretty soon you've got a Grid big enough to send a man through, with enough material and enough equipment—tools—so that he can build a really good-sized Grid, see? So then, after the Grid is built, you don't need the starship any more."

"True. But why not puts bigger Grid in starship?"

"Not enough room. The trouble with the Vargans Drive is that the power consumption goes up as the fifth power of the mass, which means that a space . . . a starship can only be about as big as your arm if its going to go any distance at all into deep space."

"Um . . ." Robard looked at Tad for a long minute. Then: "I says not that I understands ya. But I believes ya. Ye', I believes ya."

Tad's respect for the old cacique went up a couple of notches. He was unwashed and ignorant and his viewpoint on just about anything had been thoroughly warped by the mean circumstances of his environment and history. But he was capable of grasping that there were things he couldn't grasp, but which none the less might be true.

And then, having come a little ways out of his narrow shell, he turned and went back in again. All the way in.

"But I sees not why a man sends out a ship that comes no' back. Loses all that metal? Orse-son! Not goings ta do man no good if it be's twenny-fi' year gone and he be'd dead, time she comes back: do's man no good, says true."

And then, before Tad could explain the advantages of long-term investments, or use the ancient metaphor of the old man who planted trees for others as others had planted trees for him, Robard stood up.

"Gots ta go look over the grain-crop ta Headman Fald's holding, sees what my double-tithe likely be's. Back before sundown." He gave Tad

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a snaggle-toothed grin. "Makes ya'-same ta home, Mestor Tad. Robard's place be's your place."

Gail'sson Bayer Tad reined up on the orse and looked over the Gridplain before him. The animal didn't move. An orse was remarkably easy to control, once you got the knack. Odd, that of all the native animals only this one had been domesticated; odd, too, that its Terran counterpart, from which the name must have been derived, had utterly vanished from Hogarth's Planet. But Tad didn't spend much time on these speculations. Neither zoölogy nor ecology was his province.

Beyond stretched the Gridplain, not a big area, really—a hundred meters on the side, ten thousand square meters of grass surrounded and dotted like another Stonehenge with the ten-foot-high pillars that had once held up the Grid. He glanced at the now-ravaged pond where the last remaining bit of the Grid had been only yesterday—and smiled thinly at the thought that Robard had no idea that the pillars themselves were reinforced with steel. The old pirate would have torn them down in a passion, had he known. One hundred and twenty-one pillars, spaced ten meters apart over the whole area, standing at attention like the soldiers sprouted from the dragon's teeth of Cadmus.

He wished it were as easy for Project Retouch to get technicians as it had been for Cadmus to get soldiers. He wished he had at least one other man to help him rebuild the Hogarth Grid. Not even another technician, necessarily; just someone who could carry a gun and keep an eye out for trouble while Tad did the work; someone he could talk to without feeling as though he were speaking through a language filter.

But he remembered what his immediate superior, June'sson Litvinov Bob, had said—was it only seven days ago?—when they were warming up the transmitter for one final test before sending Tad himself.

"One man's all we can spare, Tad," Bob said. "I wish we could send a dozen. I wish we could do a little reconnaissance, to find out more about the people there—or even if there *are* any people. But we can't afford the energy output. We're straining the budget as it is, to send out all that mass with you, to so small a grid piece."

The transmitter chamber itself was smaller by far than the old heavy-duty transmitters had been; instead of the huge, hundred-meter-square cages that had been the focal points of a far-flung system three hundred years before, this cage was only a small one—thirty meters on a side. Tad looked at it and nodded as Bob went on.

"You'll have to do your own recon work; the only thing we can tell you is that the probe beams bounced off a section of grid that is probably the remains of the elevator. The mouse we sent came back damp, but alive. We analyzed the water in his fur, and it's just stagnant pond water—noth-

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ing to worry about. Can't be too deep, because the grid section is within five feet of the surface. Naturally, if you run into any immediate trouble that you can't take care of . . ."

Tad said, "Like dragons in the pond?"

". . . Just thumb the button on the handle of your personal case, and we'll snatch you back immediately." Bob's face did not accord the quip so much as a flicker.

"But only if there's no other way," Tad said, quietly serious now, still looking at the transmitter cage.

June'sson Litvinov Bob considered this, gravely. He was a rather grave young man in all things. It was seldom that a smile creased his thin, bony face. He weighed Tad's comment, and its implications. Then, judicially, he said, "Well, now, if your *life* is in danger, don't worry about the expense. You're worth more to us than the cost of the power." He reflected again. "Considerably more."

Tad said, "That's good to know. But—if you have to pull me back immediately, it'll be another year before we can try again."

Bob nodded. "Right. That's the whole trouble with this project. Nobody's really frightened of the colonies any more; the Rebellion's ancient history. But there's still a certain touchiness on the subject. Look at the way the Hegemonic Government gives us this tiny grant, tells us we have to dig up the rest of the money by ourselves, and then hedges us in with more restrictions than they'd put on suspected plague carriers." His voice took on an aggrieved note.

Since he considered himself a realist, Tad shrugged. "That's to be expected," he said, "since we're being used as a political fulcrum. Rosita'sson Keefer Sam doesn't give two hoots for the Project itself, but he wants to be Chief Delegate, and he's using us to pry his opponents out of office. If we succeed, he tells the Grand Assembly that the Hegemony is hidebound and reactionary and needs a new government. If we fail, his line is that the Hegemony is the victim of governmental extravagance—and needs a new government. Heads, he wins; tails, his opponents lose. What do you expect? No wonder the Government is so cagey."

But Bob wouldn't buy that. "It's more complicated than that," he said, frowning. "It's a matter of economics, of sociology. The Hegemony *is* hidebound and reactionary—not just the Government, but our whole society. We've kept ourselves *to* ourselves for three hundred years—no exploration, no new frontiers, no new ideas: We're not just stale, we're moldy!

"Why, look at us—technicians!—carrying our silly dirks and daggers and short-swords and all the other absurd insignia, looking for a position just a little higher up the ladder, and wanting nothing better than security—freedom from worries.

"Nobody wants to try anything new, or spend money for anything that isn't a tried and true, sure-fire in-

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vestment. The circle is drawing in, Tad. Another fifty years and we'll be taking in one another's washing."

Tad grinned at him. "And it's our job to go out and find new people to do our laundry?"

"Or some new laundry to take in. If we can open up the Outer Worlds again—let's not think of them as 'colonies'—without making the mistakes we did last—we can stir up the atmosphere around here, at least."

Gail'sson Bayer Tad said, well, he'd do his best. "Although I do feel a little bit as though I'd drawn an assignment to build a city in a jungle, with only my own hot little hands."

A click of the tongue from Bob. "Hogarth's is no jungle. Besides what your success would prove in terms of economy, rebuilding a grid on a lack-metal planet, the fact that it *is* so poor in the heavy metals is what makes it the safest of the Outer Worlds. You won't have to worry about being met by a fully-equipped army, or anything like that."

This seemed logical enough. Tad nodded. Bob continued, "And, after all, you don't have to set up one of the big, standard-sized grids. There ought to be enough pillars standing to put up a thirty-meter-square one, which is all our transmitter needs right now. You've got the tools and equipment to do it, if you can get any help from the natives there."

"And if there aren't any natives? Or none in the vicinity?"

With an Ask-me-something-hard-please expression on his thin, serious face, June'sson Litvinov Bob said, "Then you come back, and we wipe this particular phase of the Project off the books."

As long as you don't wipe me *off the books,* Tad thought. But aloud all he said was, "Fair enough."

And now, seven days later, he still wasn't sure whether the Project would be wiped off the books or not. Not only had his original contact with Sirius V been destroyed, but he was beginning to wonder whether he would ever be able to establish another. Robard had said that the messenger he had sent to Greatbay City should be back within three or four days. Six had passed already. If the High Grammestor was going to send for him, why hadn't he done so?

Not that he, Tad, was looking forward to the ride, but since it had to be done, better sooner than later; and then on to the job he'd come to do.

He dismounted and walked over to the area where he had decided to build his small section of the greater Grid to come. He had found twelve pillars in one part that made up a thirty-by-thirty meter square, and careful measurement showed that they were all in close enough alignment to require no further adjustments. The pillars had originally been sunk deep enough into the ground to keep them upright under tons of thrust. So few of them were out of line, even after more than three hundred years, that Tad suspected they were securely fastened to the planetary bedrock, hundreds of feet below.

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He walked around the set of pillars he had chosen, laying out in his mind the steps necessary to begin construction, although such thoughts were certainly a little premature. He'd have to make the beams first, before he started putting them up, and making the beams would be the toughest part of the job. But he'd like to get started.

Maybe the ride to Greatbay City (*City!* Robard's place, multiplied by a hundred, stink and all, probably! Doubtful if all Hogarth contained enough people to populate a decent suburb on Sirius V.) wouldn't be so bad, after all. Certainly he felt more vigorous and alive since he'd come to Hogarth's. The higher oxygen content of the air here accounted for that, most likely. He hadn't had a chance to run an air analysis yet, but the way things burned here, with a brighter, whiter, faster flame than he was used to, showed that the percentage was more than the twenty-two per cent norm on S-V. And then, too, it might have been the abrupt change from the overheated social atmosphere he was used to—used to, and, to tell the truth, a little sick of; realist though he claimed he was.

He heard the rapid thudding of pad-feet, and stepped out from behind a pillar to see who was coming, his right hand hovering near the opening in his jacket. He still felt uneasy around these people.

As the orse and rider drew closer, Tad recognized Edder, Robard's younger nephew, pushing his mount for all it would go.

"*Ya there! Ya there! Mestor Tad!*" he shouted as soon as he saw the technician. "Gets on ya's orse and comes!"

Tad frowned. "What is it? What's the matter?"

Edder pulled his orse up to a pawing halt. "Ya's gots ta comes back ta Grammestor's house! High Grammestor issame is comin's! Grammestor Robard—"

Tad climbed into the saddle while Edder babbled on, half incomprehensible. Tad gathered that an advance guard had been sent ahead of the main party from Greatbay City to warn Robard of the coming of the High Grammestor himself and a retinue of several of the leading Grammestors of Yarkrite.

Evidently, Tad thought as he urged his orse to keep up with Edder's, it would not now be necessary to make a trip to Greatbay City. The mountain had come to Mohammed.

Although exactly who or what "Mohammed" was, he had no idea.

As they rode back, Tad reviewed what he had been told about their illustrious visitor. The current High Grammestor, named Maddan, had held office since the death of his predecessor, two years earlier. He had been elected, as was the custom, by the fifty-odd Grammestors of Yarkrite, winning over his nearest competitor by a large majority. Maddan, in his own right, was the ruler of a district some distance north of the capital, which his bonded heir now governed as deputy.

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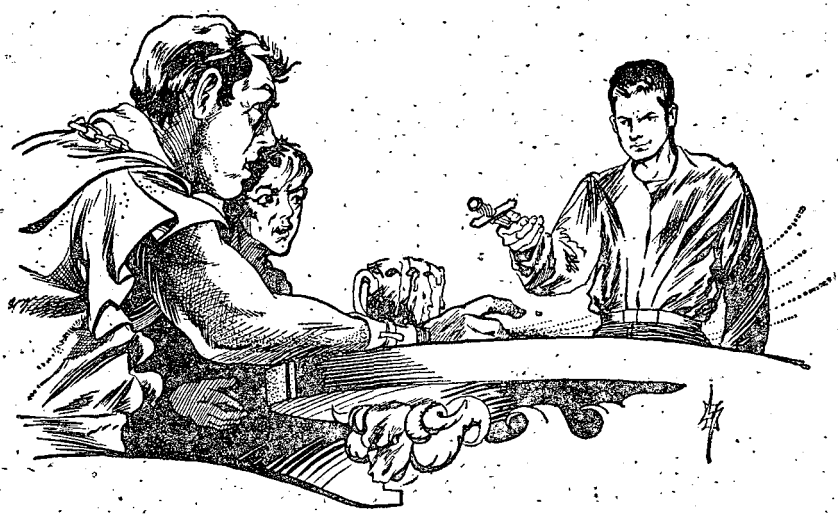
"E be's a sage one, Maddan," old Robard had said. "Winds Grand Chapter rounds is liddy finger. Knows lore, keeps peace . . ." And he had begun to tell an involved and prolix story of how Maddan had brought to heel Robard's hated enemy, "Orseman, almost bald, with a severe and wrinkled face, and agate-green eyes which might have been those of a much younger man. He was dressed in surprisingly clean white wool, and the sporran at his belt was blue—dyed lambskin.



son" Arnat, a recusant sachem, on three separate occasions.

Tad had imagined someone of noble stature, white-haired and white-bearded, his brow bound with a fillet, his noble visage filled with stern but kindly wisdom. And, indeed, when he ran his eyes over the group of strangers gathered under the trees in Robard's courtyard, he did see someone who—except for the fillet—answered that description. But it turned out to be a Grammestor named Eftor, whose lands marched with Robard's on the west.

Maddan himself was a small, spare

Except for Maddan, all the strangers were standing. As with the first meeting with Robard, no introductions were made. Edder and Tad dismounted, and Edder slipped around to stand with a group of younger men of his own status. Tad, not knowing what else to do, simply walked up to Maddan, gave him a short bow, and then stood waiting.

After a moment's silence, during which Tad was appraised by shrewd eyes, Maddan spoke.

"Ya be's a Sirius, eh? Knows ya Prokkyon?"

It took a moment for Tad to realize

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that Maddan meant Procyon. "I've been there," he said carefully.

"Knows ya this'n?" he asked softly. He opened his hand and disclosed a small photograph, covered with glass —the first Tad had seen here—and mounted with gold. Obviously, by the way Maddan treated it, and the fact that it was rimmed with precious metal, it was of some religious significance. Tad recognized the face that gazed at him from the ancient photo; he'd seen it in several of the books he'd looked at while researching in preparation for this trip.

"Yes," he said, "it's—"

"Soft!" snapped Maddan. "They's youngers ere as be's not a high degree!"

Tad obligingly lowered his voice so that only Maddan could hear. "It's Sarah'sson Hogarth Willem." Then, as something more seemed desired, he added, "The discoverer of this planet."

"Ye'," Maddan said, nodding his head. "The Finder." It seemed to Tad that the men who had been watching let out their breath together when they saw that nod.

"An' knows ya th' use a this?" Madden asked in the same soft voice. He held out a hand, and a nearby Grammestor handed him an object wrapped in finely-woven red wool. He unwrapped it reverently.

"It's a slide rule," Tad said. He thought of mentioning that he had a better, larger, more complex one in his case, but he decided not to.

Maddan thrust out his wrinkled under-lip. "Ya names it true," he said. "Now we asks ya—" He paused, then went on: "Ta what power must ten be raised ta give twelve?" And he handed Tad the slide rule.

Log to the base ten of twelve, Tad thought. He could give it from memory, but evidently the proper procedure was to work it out on the slide rule. He took it, went through the operations, and opened his mouth. Then he closed it again and looked hard at the slide rule. How many places were required in what was obviously a ritual answer? Probably no more than could be read on the scale. "One . . . point . . . oh . . . seven . . . nine . . ." he said slowly, watching Maddan's face, waiting for a sign that would tell him that he had gone far enough. But Maddan's face didn't flicker.

Did Maddan want one more place or two? *Should I say* "two" *or* "one-eight"? he asked himself. Couldn't pause too long.

"Two!" he said decisively, throwing everything to chance.

The High Grammestor rose, his face twitching. "E knows the number!" he said tremulously. "E knows the Test Number! Ye', we sees it musts be's true, what Robard says ya tolds! Fro' Sirius ya comes, fro' th' Old Worlds! Ta builds Great Grid again, ta brings us lore an' beauty things an metal—"

"Metal!" the word sprang simultaneously from every throat.

Maddan rose and extended his hand. Tad took it, wondered at a peculiar pressure which he felt applied.

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For a few seconds the soft old hand lingered. Then Maddan said softly, almost in a whisper, in a tone which hinted of regret, "Ya gots no mother? Ya's never travelleds?"

Tad, mystified, muttered, "Why—"

Maddan turned to face the others. In a strange sort of chanting singsong, he began to recite something. Tad was reaching for his gun, and then he stopped as he recognized the words. ". . . Invested in me, I propose to call the craft to labor for the purpose of admitting to the mysteries of the craft . . ." It was a ritual, a liturgical thing the High Grammestor was pronouncing. The accents were those of present-day Hogarth's, but the words were, by Hogarthian standards, the obsolete ones of three centuries before. ". . . Gail'sson Bayer Tad shall—"

But before Maddan could finish his chant, there was a protest. It came from Robard's younger nephew, Edder.

"*Ere!*" he cried. "*Na!* Why's it I gots ta wait my year after I be's named, an' I be's own sister's son ta Grammestor, full brother ta's bonded heir . . ."

"*Sharrup!*" Robard thundered, purple with rage.

". . . An comes a stranger as no one knows, be's ere six days, an—"

But the whole company was in full cry against Edder by now, shouting, and thumping him.

"*Baghan's* whelp!" shouted white-bearded, patriarchal, old Eftor, his face the color of his scarlet shirt. "Ya breaks inta High Grammestor's words? May ya's iron rusts!" And Edder was silenced, his face sickly under its blue stubble. Robard's hands twitched by the knife at his belt, his expression one of shame and rage.

Maddan waited quietly, then said: "Ya's young; ya knows not lore. A High Grammestor can makes a smith on sight an' gots not ta wait." There was a rumble of agreement.

Then, as if there had been no interruption, Maddan continued with the ritualistic phrases.

When he had finished, many of those present began rummaging in their gear, drawing out leather aprons and gloves and putting them on. Then, as they formed into pairs for a procession, Tad was introduced—if the word could be applied to Maddan's merely naming the various men—to eleven Grammestors, the deputies of two more, the bonded heirs to eight of the eleven, and to various headmen. Those who were left over, being younger kinsmen and retainers of low rank, stayed behind as the procession moved out.

They passed from Robard's castle into the village. One of the Grammestors had produced a small drum from somewhere and was beating out a march step—*PUM-piddy, PUM-piddy, PUM-piddy* . . .

The villagers stopped whatever they were doing to turn and look at the procession. They doffed their hats, and silently came closer to watch.

The procession wended it way

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solemnly to the other walled enclosure, the smithy, where Tad had never been.

Inside, he saw storehouses, open on one side, where great heaps of charcoal were stacked. Off to one side were smoking, baked-earth kilns, where the charcoal was being prepared. The men working at the various places around the enclosure merely touched their brows when the procession entered and went back to work; some, who could not interrupt what they were doing without disaster, didn't even do that.

Tad had an idea that some of the charcoal manufacture was actually make-work, since there was more than this metalless culture could normally use in smelting and forging. Or, he thought, perhaps it was stored for fuel in the winter.

The procession paused at the door of a strongly-built edifice of mortared fieldstone, and Tad was blindfolded. Maddan whispered further instructions in his ear. He waited a while, then the procession moved onward, with Maddan guiding him. Behind them, the doors banged shut.

He heard Robard say: "*Comes a stranger from afar.*"

And then a voice—a deep voice. Suddenly Tad realized that it was the same voice he had heard in his half sleep the first night he had spent in Robard's castle.

"*What wants he?*"

And Tad replied, as Madden had instructed him: "*Light.*"

Thus it was that Gail'sson Bayer Tad was initiated into the mysteries of the smithy craft, told of High Ram—the master craftsman of an ancient king, the solemn one—the widow's son, who died rather than reveal the mystery to those who were unworthy; of how the act of working metal from shapelessness into form symbolized the Primal Act of the Grand Artisan of the Universe; how men learned, by a proper study of the mystery of the craft, to shape their own lives and natures and purge themselves of dross . . .

It was only at this time that Tad realized that the government of the island was actually a theocracy, a sort of Papal State, with the High Grammestor as a Supreme Pontiff who held temporal as well as spiritual power. Whatever had remained of civilization, of technology, religion, and culture on Hogarth's—the very planet itself being symbolically identified with "the widow's son"—had undergone a process of syncretism with a tradition far older than either human habitation on Hogarth's or the Debacle of the Abandonment itself.

They took him up through all but one of the degrees at one session—a thing, he was told later, which had not been done within the memory of living men. The only degree to which he could not attain was that of High Grammestor itself.

I came to laugh, he thought towards the end, *and stayed to pray.*

The procession wended its way back to Robard's castle, this time with Tad, as a newly-made Grammestor, clad in a leather apron and leather

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gloves, occupying a position of honor next to the High Grammestor himself.

Inside the castle, a respectable feast had been laid out, bigger than the one Robard had treated him to six days before. This, however, was a more formal occasion: Robard was guesting his peers. There was, as before, heavy drinking, and long speeches as well. Tad tried to look interested, but his mind and eyes wandered. He noticed that one face was missing; Edder was nowhere to be seen, although his brother, Soby, was in plain sight. And sound. Tad wondered what had happened to the [illegible] branch of the family for his [illegible] and almost blasphemous outburst.

Finally, when the last Grammestor had made his last ceremonious hiccup and sat down, Tad had to make a speech himself. He began by trying to give them some idea, choosing his words carefully, of what life on Hogarth's would be like when it was again in communication with the Old Worlds. But the slack jaws and the uncomprehending, though awed and respectful, stares which met this attempt put a quick end to it.

He made his concluding remarks short, full of implied beneficence, and no specific commitments at all.

The guests growled their approval. They had understood as little of his speech as they did of the archaically-phrased ritual of the smithy lodge, and were thus very much impressed. It was a feeling of pious satisfaction which soon had most of them deep in their cups. Old Maddan caught Tad's eye and gestured to him, rising as he did so. They left the banqueting hall for an anteroom lit only by a guttering tallow-dip.

When he sat down on a pile of fleeces, the High Grammestor faced the younger man and looked at him earnestly with his agate-green eyes. "Right noble an' worshipful Grammestor Tad," he began, "ya says that we builds Great Grid again, as the faith we kepts tolds say, an' brings elp ta the widow's son?"

"That's right."

"An' ya wills ta puts all tha' metal up on Gridplain? In plain sight, where all musts ta sees?"

"I don't see how else we can do it," Tad said, somewhat baffled.

"Then I tells ya—and I binds ya ta silence—that ya musts ta fail."

Tad stared. "What? You mean you *want* me to fail? Why?"

The old man shook his head and smiled ruefully. "Na, na, worshipful. If it be's for the Grand Artisan a the Universe ta keeps me alive till I sees Great Grid remade, an' I gots ta die then an' there, I dies content. We *needs* Great Grid, I tells true; Ogarth be's never mades for man ta lives on. We musts ta haves iron in the soil an' other metal besides, or we dies ere. But each year an' each day more a the metal be's washed away. The pigs a metal we has in keep for bond mights ta elp, but Grammestors a Grand Chapter never be's allowing precious metal ta be's lets ta rust ta makes fertilizer. Na, na; they hungers for metal too great.

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"An' that's why ya musts ta fail. Like a wheel musts ta turn when orse pulls cart, so Ogarth men, when metal lies in open, musts ta steal it. It be's their nature."

Tad nodded. "I can believe they might *want* to steal it, but it wouldn't do them any good if they did." He smiled grimly. "If they got their hands on a chunk of metallic sodium, they wouldn't want it for long, believe me."

Maddan's eyes narrowed questioningly. "Why says ya so?"

"Because, in the first place, the stuff is as soft as the tallow in that candle, there, and, in the second place, it burns a damn sight faster. Just a little moisture is all it takes to set it off."

Maddan's eyes narrowed further. "Then how's ya ta makes Great Grid out a such metal?"

Tad explained how magnesium-clad busbars were made.

"Ya makes hollow pipes, then," Maddan said thoughtfully. "An' ya fills 'em with the sodium. Buy why do's ya not make the beams solid out a magnesium?" He pronounced the word slowly, unused to it.

"Because magnesium isn't as good a conductor of electricity as sodium. We need the magnesium for strength and relative corrosion resistance, and the sodium for conductivity, so we combine them, you see."

Maddan nodded slowly. "I takes ya's word that it be's true; I do's not t'understand, but I takes ya's word." Then, after a pause: "But there be's others as mights not ta take it. Ya says metal burns; I takes ya's word as true. But others mights not."

Tad wondered just what the old man was up to. Did Maddan want the Grid rebuilt or not? It seemed to him that the old man was being a little bit devious in his approach to the whole matter.

"I'll give them a demonstration," said Tad. "I'll show them how the metal burns. Besides, can't you put a cordon of soldiers around the area?"

"Mights ta elp," Maddan admitted reluctantly. "But ya sees, young worshipful, ow we be's ere. Like beasts. Each ates th'other. I sits in the middle, keeps a balance. I *as* power, says true. But I musts not t' ave too *much* power! Time I do's, they stops t' ates each other and they ates *me*. They combines against me."

He frowned a little and looked through and past Tad, as though contemplating something in the infinite distance. "Men's minds be's hard ta makes ta change. They be's stubborn. They looks not ta new things, but holds fast ta old. Be's some as thinks it better ta dies than ta change." Then he looked up into Tad's eyes. "I be's not strong enough, not in Grand Chapter, ta makes grammestors an' smiths ta change, ta makes needful changes in ways a living.

"But I has not the power ta even keeps a guard around Gridland if there be's that much metal in sight. Grammestors a Grand Chapter wills ta thinks I be's tryin' ta keeps metal for own use, ya sees."

Tad thought he was beginning to

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understand then. The old man fancied himself some sort of Macchiavelli who, by hook or by crook, had to maintain the balance of power between the Grammestors in order to stay in power himself.

"Well, then," he said smoothly, "why not make sure that they don't get in each other's hair? Keep the balance, if you must. Why not assign a mixed troop of guardsmen to guard the Gridland—a fixed number from each Grammestor, to be picked by the Grammestor himself? That way, each will know that his own interests are being watched, and he can keep an eye on the others."

Maddan looked thoughtful. Without another word, he rose, and, with his hands clasped behind him, walked over to stare out the single window towards the star-sprinkled night.

Tad prudently said nothing, speculating on what was going on inside the mind of this barbaric half-king, half-priest. He decided then and there that he'd have to keep an eye on Maddan. Not that he suspected that the High Grammestor would deliberately try to sabotage work on the Grid; he felt that the old man honestly wanted to see it rebuilt. But he was certainly capable of using the situation to his own ends.

There was a long silence. A dim noise of drunken revelry filtered in. A drop of hot tallow fell with a tiny splash. Then, abruptly, Maddan turned to face the technician.

"What musts ta be, musts ta be. We sets the guard around Gridplain as ya says, each Grammestor watching his own. Now, what is it ya needs ta build Great Grid?"

For the rest of the evening, they discussed materials and labor.

Project Retouch would go ahead as scheduled.

The bloom wore off the peach fairly rapidly. The next four months were months of hard work for Tad—not only physical labor, but intense mental and emotional strain.

The actual technical work was relatively easy. No one, fortunately, had attempted to break into either of Tad's cases—although they would have found it difficult, even with metal tools, and almost impossible without them. The power pack itself was the whole basis of his operations. It was a small, compact, inordinately expensive mechanism that burned hydrogen directly into helium, converting the resultant energy directly into electric current. Fueled by the water condensed from the air, it could produce plenty of current on very little fuel—but the supply of nucleo-passivated californium-254 necessary to force the reaction was terribly expensive, and the stuff didn't act as a true catalyst, since it was slowly used up in the reaction.

Building the graphite-encased electrolytic cells for the production of magnesium and sodium was a difficult job, even with the best of equipment.

But, by the end of the third month, he was producing the current-carrying grid beams that he needed. Magnesium salts were rare in the sea salt,

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but there were enough to produce the cladding that would protect the metallic sodium filling from oxidation in the oxygen-rich air. The main beams, which stretched from one pillar to another, to support the smaller beams, were triangular in cross section, a little less than two feet on a side, made of inch-thick hardened magnesium and filled with metallic sodium. They were somewhat larger than the copper beams that had been used to build the old Grid; as they had to be to carry the currents which would be induced in them by the transmitter on Sirius V at the moment of transmission. Fortunately, the induced current flowed for less than a microsecond—otherwise, the tremendous energy would have burned them up. Even those huge conductors couldn't have carried the current for more than a tenth of a second without breaking down.

By the time four months had passed, Tad had built his main beams and was adding the smaller cross-beams that would cross between the larger ones.

It would have been an impossible job if he had had to do it by himself without the aid of the corvee, the levy exacted by Maddan of all the subordinate grammestors. Each was required to produce a certain number of men, serfs and soldiers, calculated on a pro rata basis according to the population of his fief; as well as rations to feed them. A considerable reduction in manpower was allowed those from whose lands salt was forthcoming, and similar dispensations accorded those supplying orses, carts, extra rations, or metal.

The latter provision, of course, was merely a ritual phrase. No sachem turned in so much as a nail.

The plain adjacent to the Grid-land resembled an ant heap. Caravans of carts soon wore ruts in the ground as they wound in, laden with salt, and departed, empty. There were not enough carts, not anywhere nearly enough. The lack was supplied by porters, long files of them, bent double beneath their burdens; and by pack-orses, used mainly for sea salt, a wooden box on each side of each beast. To unload every box would have taken too much time; instead, the bottoms were made of slats which slid out, allowing the salt to run down, and then replaced. The heaps of salt were quickly shifted, by wooden shovels, to huge piles.

The raw materials were taken by hand-barrow to the field-stone and mortar building hastily run up for Tad's workshop, a building ceremonially granted the sacred and inviolate character of a smithy—though not even the most lore-rich grammestor could begin to understand what went on behind those narrow slits of windows. To forge iron, heated red-hot in a charcoal fire, was one thing, a thing they all understood very well. But Tad alone understood the difficulties involved in extracting magnesium and sodium from sea salt; the mysteries of electricity were unknown to the men of Hogarth's Planet.

Continued on page 150

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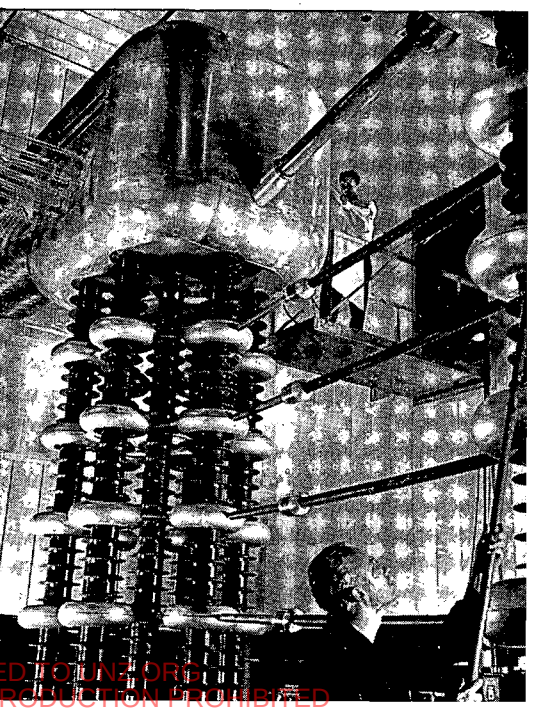
SCIENTIFIC BREAK-THROUGHS

By H. C. DUDLEY, PH.D.*

The development of new apparatus always provides scientists with new tools to do new jobs, to discover new facts which lead to still newer apparatus. Now gigantic gadgets are being used to push the frontiers of science to new levels, even below the electron.

One of the first atom smashers was the linear accelerator, improved and perfected by Cockroft and Walton in the 1920s. Here is shown a 750,000 volt unit which accelerates protons (p^+) in a straight line. This is used to give the first push to the protons as they are fed into the next stage of acceleration, at the Brookhaven National Laboratory, Long Island, New York.



* The opinions and conclusions contained in this article are those of the author and are not to be construed as official or necessarily reflecting the views of the U.S. Navy Department or U.S. Naval Service at large.

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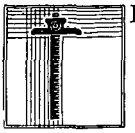
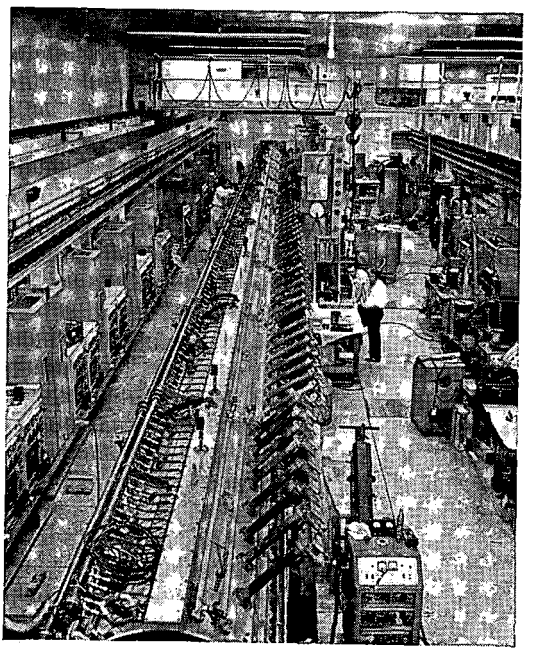


HERE has been, to very recent times, three great periods in science, which might well be called fundamental "breakthroughs." Each of these involved the study of the interaction and relationship of matter and energy, and were made by men motivated primarily by curiosity and a thirst for knowledge. These periods represent the highest type of what we call "basic research," and provide the foundation on which much of modern science is built.

Following close on the heels of the introduction of the observational and experimental method in science, Isaac Newton, in 1700-1725 developed the theory of gravity, and the laws of motion. It was by these concepts that Newton was able to explain the movement of heavenly bodies. He was able to show how by the balancing of forces—attraction of mass for mass vs. angular momentum —that these gigantic spinning masses were able to hurtle through space on accurately set courses.

On the basis of Newton's explanation of gravity, scientists have for the past two hundred fifty years built up many theories, attempting to explain the hows and whys of the universe. One of the most widely known theories of creation is the ever-expanding universe or the "big bang theory," which estimates that at some time, perhaps five or more billion

Photographs: Courtesy of Brookhaven National Laboratory



In this gigantic 110 foot linear accelerator (LINAC), the protons are progressively accelerated to a speed approaching that of light. The voltage builds up step wise from an initial (—) 750,000 volts to a final (—) 55 million volts. (55Mev).

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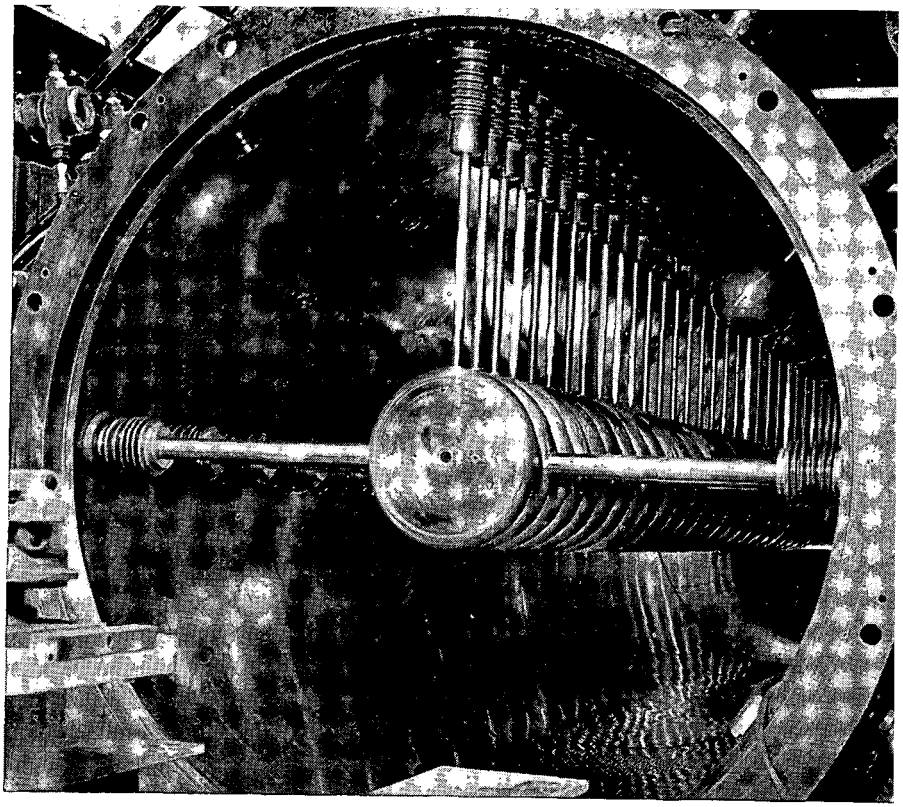

Here is shown the inner construction details of the 55 mev LINAC, showing the riflelike barrel through the protons pass they are accelerated by the 124 (—) electrodes. The electrodes are the flat pan cake type units, supported by the insulators at three points. The whole is a hermetically sealed steel tube in which is maintained a near perfect vacuum, by gigantic vacuum pumps.

years ago, all matter of the now known universe was gathered together in a single gigantic glob.

Another and more recent theory of cosmology postulates that there is a constant dying off and degradation of galaxies and solar systems, the constituents going to create new suns and solar systems. You read, you look at the assumptions, you note how really little data there is, how extrapolation is skillfully piled on top of shaky guesses, and you begin to wonder.

The second major break-through came (1780-90) as a result of the observations of two gifted experimenters; Lavoisier who showed conclusively by careful analytical chemistry that caloric—or phlogiston—was not an elemental substance; Count Rumford of Bavaria, who earl-

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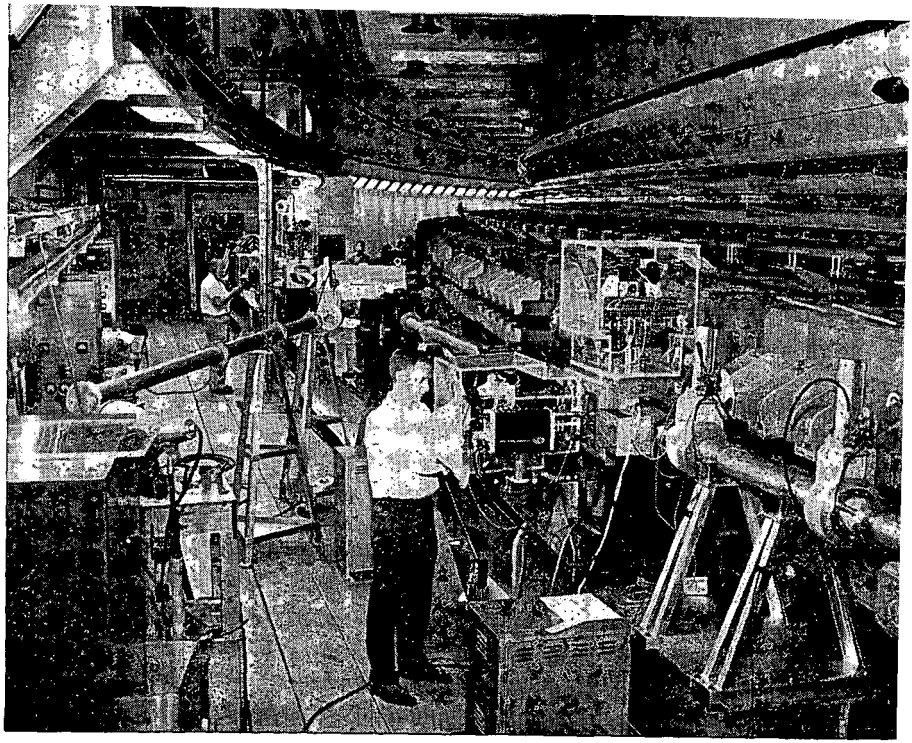

Here is shown the long tube leading from the 55 mev LINAC, into the giant Alternating Gradient Synchotron (AGC), which takes the 55 mev protons, bends the beam into a circular path, then boosts them to a speed of 99.9+ per cent of light (almost 186,000 miles/second). Here the energy of the proton reaches 30 billion volts. To indicate the size of the gigantic circular magnets the tunnel seen curving to the right in the background, could readily pass a five-ton truck before the magnets were installed.

ier was an American renegade and traitor, observed that there seemed to be endless quantities of this "elemental caloric" in the metal of the cannons he was boring in Munich. From these observations came his proof of the mechanical equivalent of heat. So the groundwork was laid in these short ten years for much of modern chemistry and physics, particularly the kinetic theory of gases. These observations by Lavoisier and Rumford eventually overthrew the firmly entrenched phlogiston theory, and introduced the true relationship of mass and energy.

The third major break-through introduced what we call "modern physics," for in 1895-1900 the particulate nature of the electron was proven by J. J.Thompson; Roentgen produced X rays; Becquerel discovered natural

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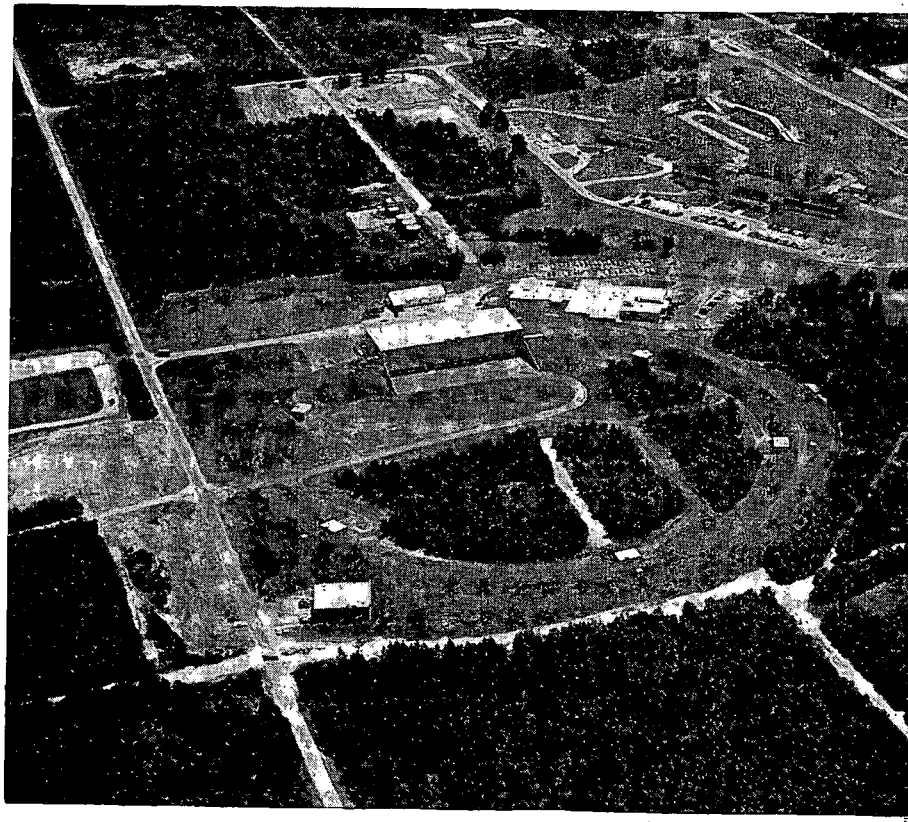
The size of the circular magnets of the AGS is shown by this aerial photo. The circumference is one half mile (740-foot diameter). Controls and Research Building is shown at the top edge of the magnet circle. The Target Building is to the lower left, isolated from other structures because of possible stray radiation. The Brookhaven Reactor Building, Hot Laboratories, and stacks for exhausting air used to cool the reactor are seen top right. The Cyclotron Building is to the right of the Reactor Building. The AGS, put into operation in 1960, is today the world's most powerful tool to study the structure of matter below the nucleus. The energy necessary to accomplish the splitting of the nucleus is a measure of the forces bound up in these tiny bits of matter.



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radioactivity; alpha and beta "rays" were first isolated, and gamma rays were shown to emanate from all the newly discovered radioactive materials.

The farfetched theoretical calculations of 1890 by Lorentz, were in 1900 confirmed by Kauffmann who showed experimentally that accelerated particles definitely increased in mass as their velocity increased. Lorentz had predicted that if the electric charge remained constant, then the mass should increase as the velocity (v) of the particle approached the speed of light (c); mathematically

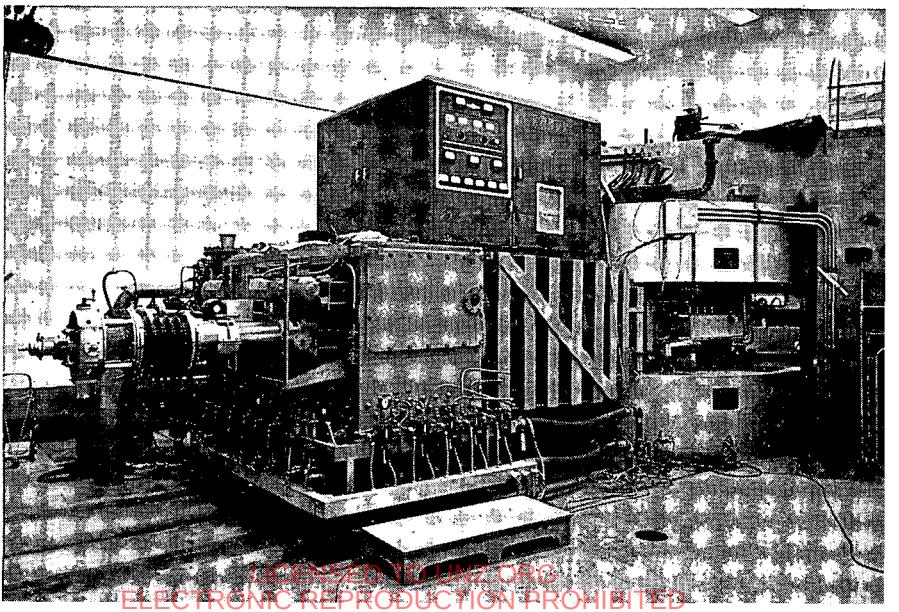
$$M = \frac{m_o}{\sqrt{1 - \frac{v^2}{c^2}}}$$

when m = the observed mass at velocity v

m_o = the original mass at low velocity, ("rest mass")

And what did these new findings, new data, mean to the scientist of 1900? Simply that a whole new era had opened up, requiring a complete revision of the concepts and theories which were held to be infallible by the leaders of that time; the complacent conformists of that era.

In the 1930s there was developed the first method of accelerating charged particles by using a circular path. E. O. Lawrence constructed the now famous cyclotron, a magnetic device used to accelerate alpha particles, protons and deuterons between the poles of gigantic magnets. Here is shown a sixty-inch cyclotron which usually accelerates heavy hydrogen (deuterons d^+), to an energy of 20 million volts (mev).



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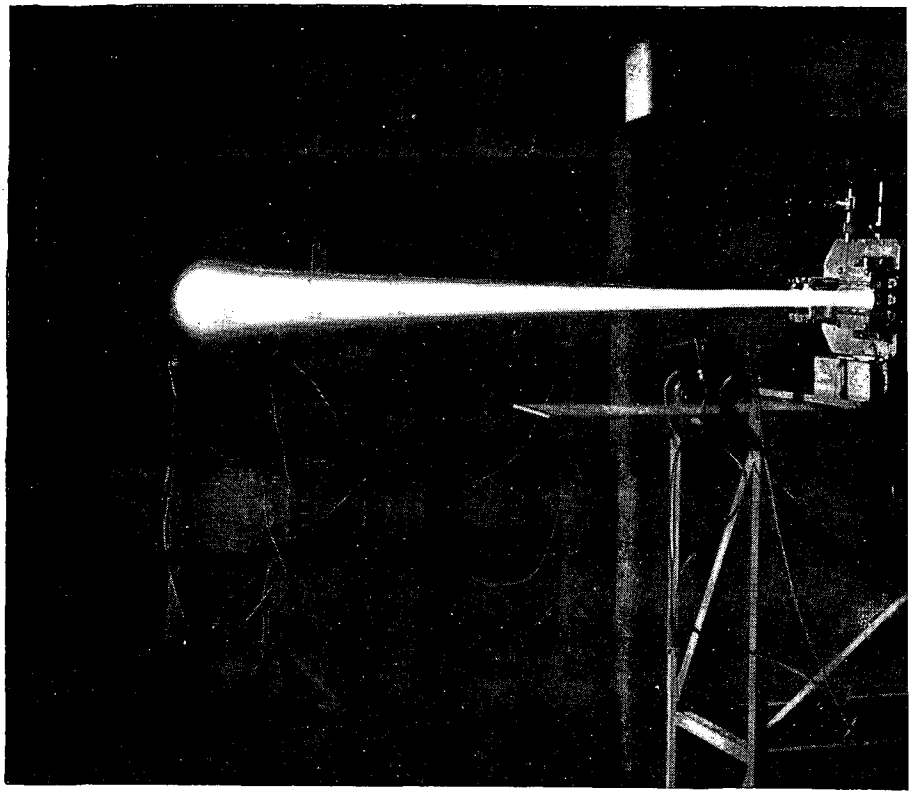

Here is shown a beam of alpha particles (α^{++}), emerging from the 60-inch cyclotron (at the right) at an energy of 40 million electrons volts. Note the sharp cut off point as the alpha particles are adsorbed by the air. The luminous beam is due to a marked ionization of the air by the high speed particles. Many early cyclotron builders were partially blinded because they visually focused these beams.

WHAT IS A THEORY?

In the above discussion the word theory is repeatedly mentioned. Just what is meant when we say "Theory of Gravity," or the Lorentz theoretical development and predictions of the increase of mass with velocity?

The word "theory" means the attempt to codify, clarify and arrange experimental data in such ways as to give the answer to the questions of How? and Why? No matter how sophisticated or mathematical a theoretical approach may become, it still is, in the last analysis an attempt to predict from the Known into the re-

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Here is shown a thirty-foot beam pipe leading from a small eighteen-inch cyclotron which produces three mev protons. The protons strike a metal target to produce an intense beam of neutrons. Of course no person is permitted in this area when the apparatus is in operation.

gion of the Unknown. Some may object to this definition, but it is the essence of what most, who are experimenters, mean when they use the word "theory."

When a scientist goes about developing a hypothesis or theory he must utilize the factual information, data if you will, *available at that time* as the firm base on which to build. Theory on Theory is risky! And what is not usually realized, this method of projecting our knowledge has a hidden time bomb planted inside. For there is always sooner or later new firsts, new relationships, new data which the theorizer did not even suspect could exist. In other words, the theorizer always assumes certain things to be true, but he concurrently also assumes certain other factors to be untrue or nonexistent. These hidden, unstated and unknown assumptions, present in every theory, are their fundamental weaknesses. These are the inherent present time

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bombs, ticking within the framework of every theory, which are eventually set off by the new data accumulating year by year.

BREAK-THROUGHS OF 1955-1960

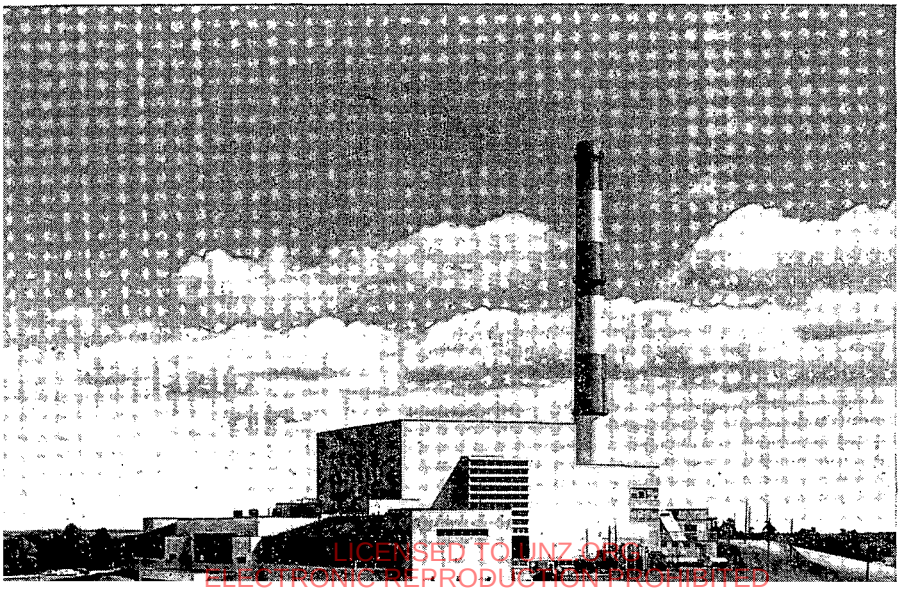
What are the assumptions of Newton's theories explaining gravity and the motion of celestial bodies? Basically, that there exists an attractive force between any two bodies, which is related to the mass of the bodies and their distance apart; mathematically:

$$\text{Force} = g\frac{M_1 \times M_2}{d^2}$$

Where d = distance center to center of the two masses, M_1 and M_2.

But what of the unstated hidden assumptions inherent to this theory? The time bomb! They are (1) that M_1 and M_2 have no electric charge, (2) that there exists no magnetic

The next gadget to be perfected in man's never ending search for knowledge grew out of the all-out effort to produce an atomic bomb during World War II. Enrico Fermi led the group who in December 1942 produced the first atomic "pile" or reactor. It consisted of blocks of Uranium stacked with blocks of graphite. A direct outgrowth of this is the Brookhaven Research Reactor, containing natural Uranium enriched with U235 and moderated with blocks of the highest graphite. In the center building is housed the reactor, while through the stack is forced the air used to cool the reactor.



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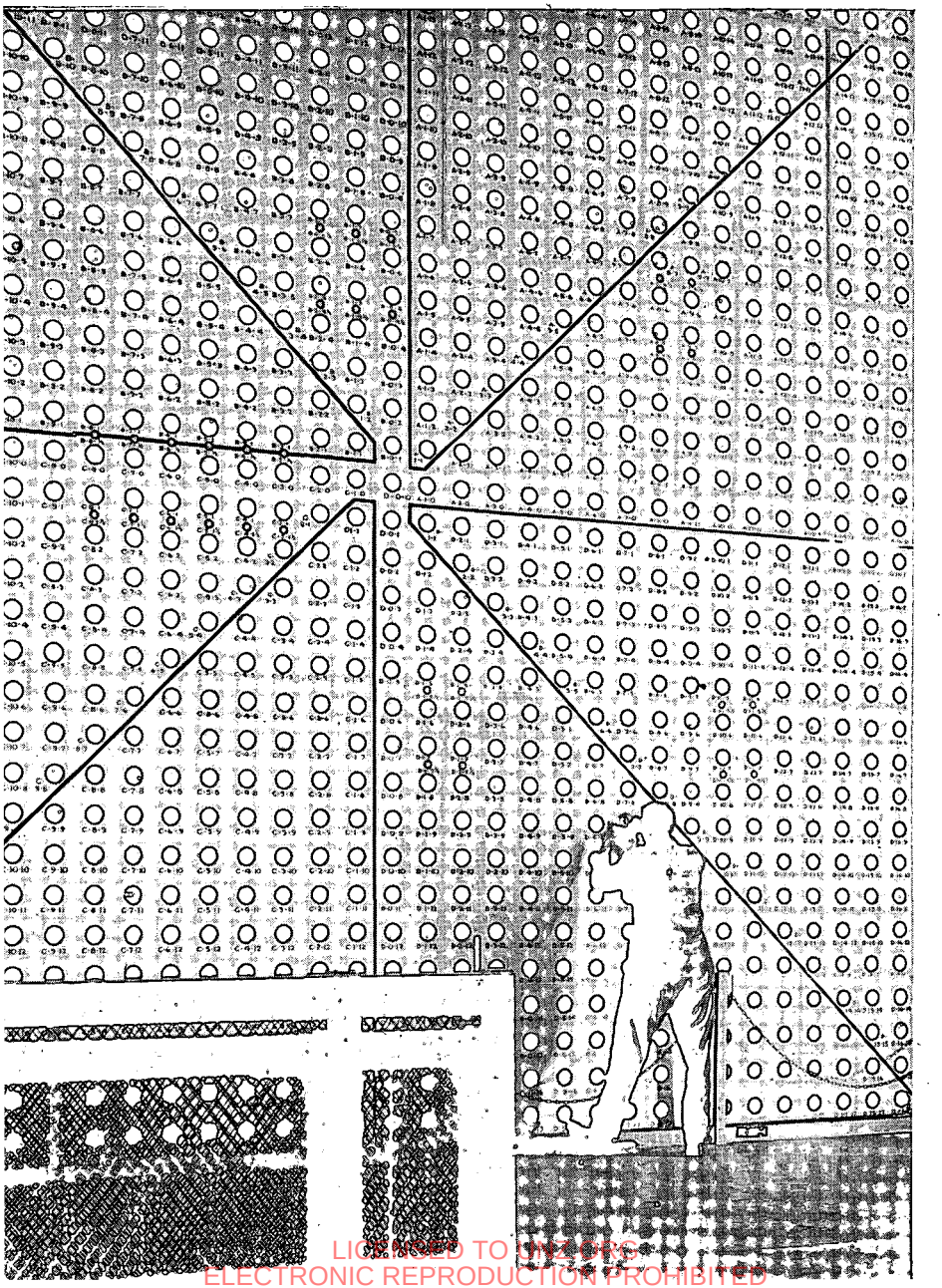

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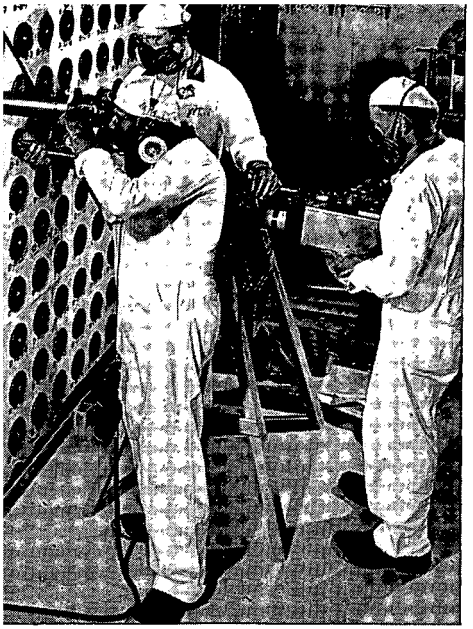

Technicians prepare to remove radioactive samples from face of reactor.

and/or electric field on or around these masses, and (3) that there exists no other interplanetary force except the attraction of mass for mass.

Let us see what is the nature of the information which is being radioed back by our first messengers into space. In February 1958 *Explorer I* told of the Van Allen (-) charged zone 500 to 1,200 miles around the Earth. More satellite and moon probes have reported and told of magnetic belts and charged zones in the reaches of near space. But in 1960 *Pioneer V* to Venus and beyond radioed back a fuller story. The (-) charged zone around the Earth extends 40,000 miles; magnetic belts and electric storms extend millions of miles into space; cosmic-ray showers do not originate from the Sun alone, they seem to come from galactic space, perhaps the Milky Way.

The data of our satellites and moon probes are supported by the Mount Wilson Observatory photos of solar flares, spreading out millions of miles along the Sun's magnetic lines of force. Our radio telescopes report strange unseen bands; our telescopic spectroscopes show a charged zone around Jupiter one hundred trillion times the charge on the Van Allen Zone. Based on recent satellite data, as well as information from *Pioneer V* the sun is calculated to be a gigantic (-) charged mass, generating at the Earth's orbit a (-) electric field equivalent to 3×10^{17} volts, (1).

Not only do astronomic studies support the moon probes, so also do recent laboratory data. Professor Allais of Paris has noted a periodic change in the swing of a pendulum (2), and believes that it is due to some "field effect," i.e., electrical or magnetic field which is changing at regular intervals. The author has utilized a Van de Graff electrostatic generator producing 425,000 volts to study the motion of (+) charged

In one face of the reactor are hundreds of holes through which are introduced metal tubes containing uranium "fuel." The wall is five-foot thick dense concrete, and the reactor "down," awaiting recharging.

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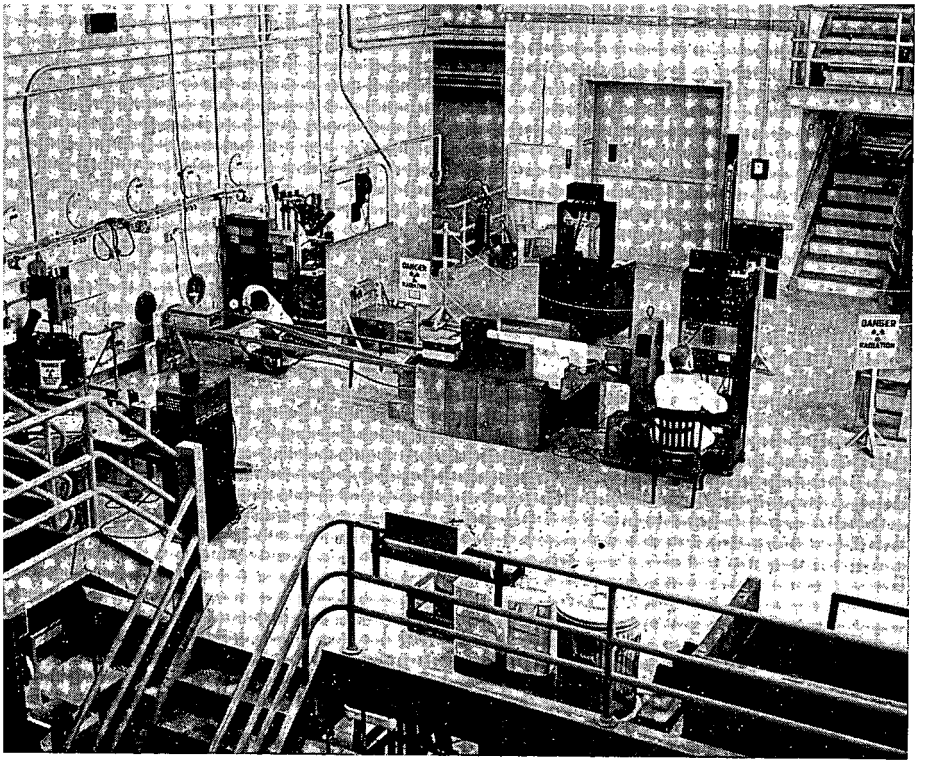

A collimated beam of neutrons is allowed to stream out of the reactor, and is measured by the counting device shown in the center of the area.

spheres. The daily and seasonal variations in the (—) field around the Earth, known for thirty years (3), is responsible for effects on these spheres. This electrostatic field influences the attraction of gravity (4).

Newton's theory of gravitation, and his laws of the motion of planets do not consider magnetism and electrostatics! He knew of only one interplanetary force, the attraction of mass for mass. But there is now evident two additional forces; electrostatics and magnetism. In his calculations of 1700-1725 Newton assumed only one interplanetary force, the corollary being that there were no other forces existing. Is it any discredit to Newton that he is proven wrong because he did not have available the radios and rockets of 1958-1960?

If one examines the general formula which describes the action of every one of these so called "forces at a distance," it will be seen why theorists have been for years trying to establish some common denominator.

$$\text{Force} = \text{constant}\,\frac{Q_1\ Q_2}{d^2}$$

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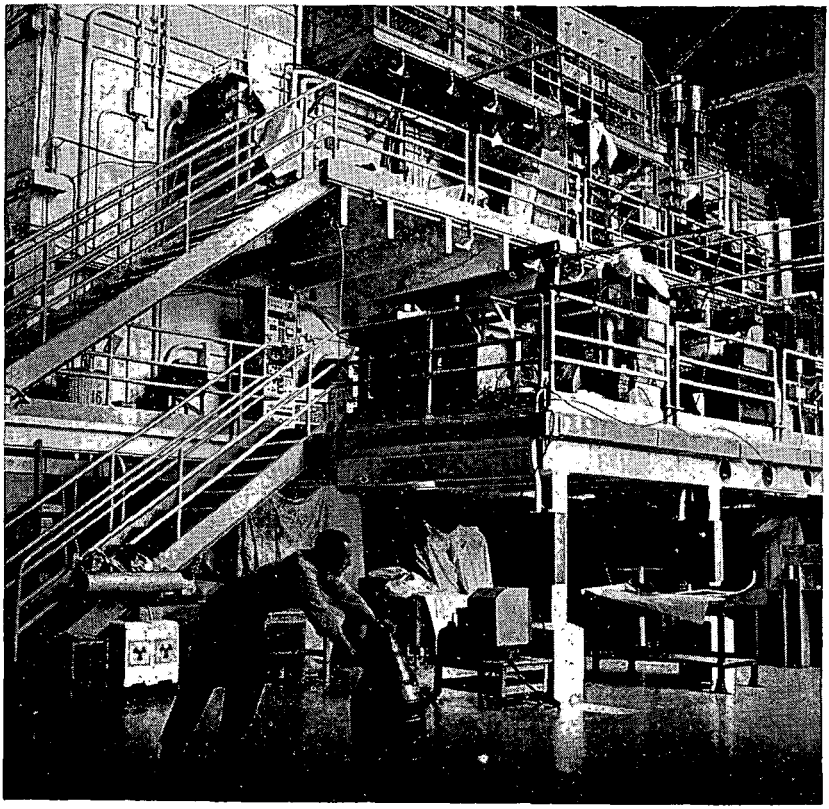
where Q_1 and Q_2 are the forces observed, with d the distance between.

So new apparatus invariably produces new information. No longer can the Universe be considered a series of inert spinning balls held in place by the balancing of the attraction of mass for mass and angular momentum. The Universe is clearly a series of electrically charged "particles" revolving and orbiting in vast electric fields, generating by these motions vast interlocking magnetic fields. This could certainly explain the origin of the Earth's magnetic field.

The experimental face of the reactor showing the maze of equipment being used simultaneously. There are thirty experimental holes in the five-foot thick concrete shield which separates this apparatus from the reactor. In foreground is a Dewar flash used to transfer liquid air, helium or nitrogen used in certain experiments.



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If suns are charged bodies, developing magnetic fields by these motions, then our sun seems to be a self-contained magnetohydroynamic system, developed around a gigantic blob of white hot plasma.

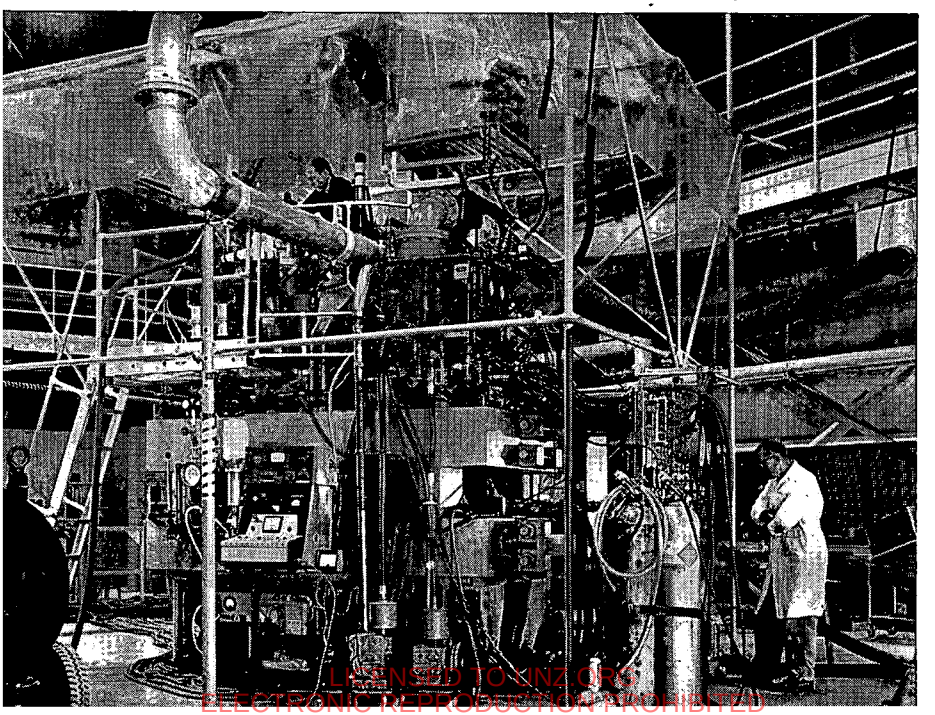
THE NEW WORLD OF THE "SUBELECTRON"

Between 1855-1915 many men furnished the proof of the existence of two new levels of the subdivision of matter, atomic and nuclear. By

Development of the bubble chamber began 10-12 years ago when D. A. Glaser now thirty-four, and Nobel prize winner of 1960, used a testtube filled with an organic liquid, to track various nuclear particles.

The principle is rather simple. The chamber contains a liquid, a mixture of liquids, or a gas dissolved in a liquid, and more recently liquid hydrogen. A light is focused through the liquid at right angles to the line of flight of the beam of atomic particles. A camera is mounted so as to observe only the light scattered by the bubbles as they are formed as a particle passes through the liquid.

Here is shown a twenty-inch bubble chamber containing liquid hydrogen. This is mounted near the synchotron (AGS), which is a source of subnuclear and subelectron particles.



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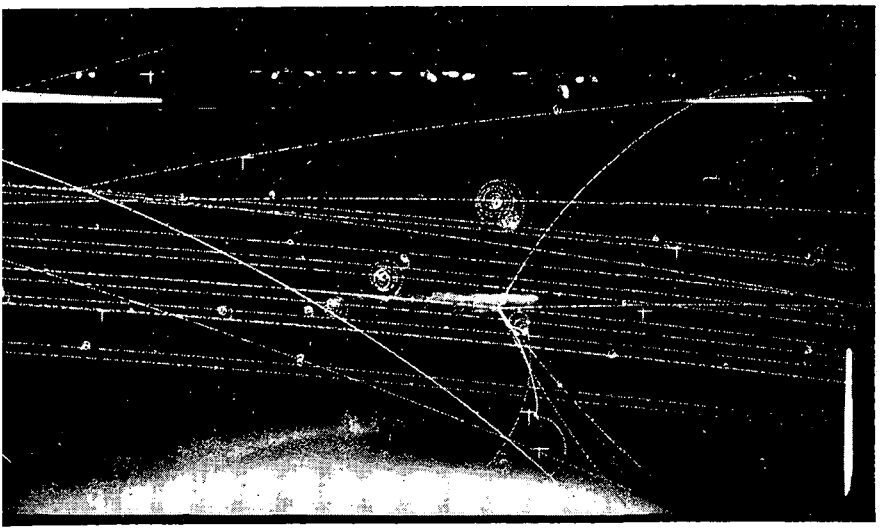

The bubble chamber is mounted between the poles of huge electromagnets, which cause the paths of charged particles to curve. From the curvature of the track, the mass, electric charge (+) or (—), and the velocity of the new particles may be determined.

Here is shown a photo of the tracks produced by a 2.85 billion electron volt proton (p^+) colliding with a hydrogen nucleus (a slow speed proton). The 2.85 bev proton came in from the left, striking the H^+ in the center of the photo, and produced six new particles, four of which are mesons. The parallel tracks are other 2.85 bev protons which did not interact with hydrogen nuclei.

1920, theories, plans and blueprints were being drawn up for the attack of the next lower level, the nucleus. Bohr had sketched out the scheme which is now so familiar to us, the (+) nucleus surrounded by a solar system of electrons (e^-). Each atom was an electrically neutral unit. Rutherford proposed a model of each nucleus made up of (+) protons, a hydrogen less its electron. To account for the weight of the atomic nucleus Rutherford also postulated (1918) a *hypothetical* particle, the neutron, having no electric charge.

In 1927 Pauli proposed a second, but much smaller neutral particle, smaller even than the electron.

In 1932 Chadwich developed the apparatus to *slow down* the neutron, and cause it to be detectable. Rutherford had been right.

In 1934 Fermi—inventor of the first atomic reactor—developed a

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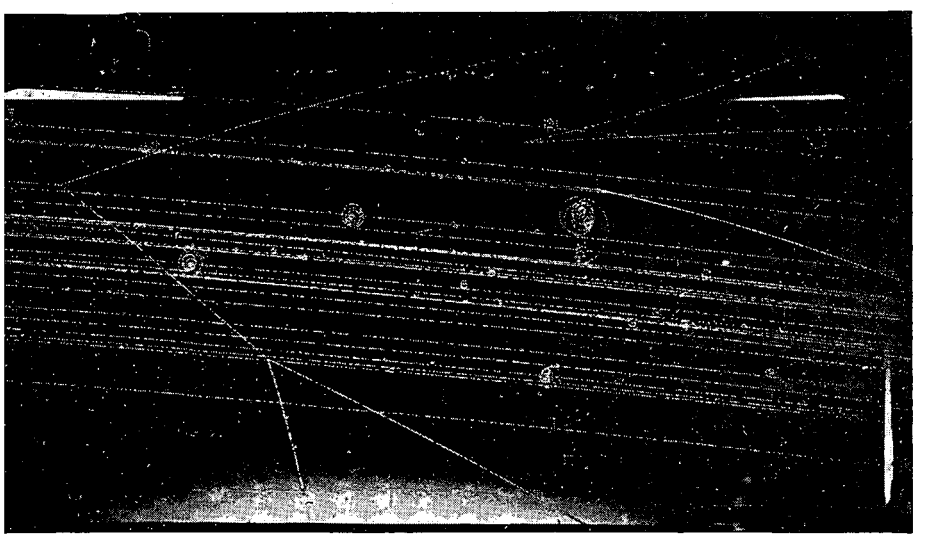
Bubble chamber tracks from 2.85 bev protons (p^+) passing into liquid hydrogen. Here is shown a two-step process. The 2.85 bev proton collides with a H^+, and two charged particles result. The lower curves show that one of these particles collided with a second H^+ and both travel along separate paths.

The tight spirals seen here and on Page 97 are the paths of electrons which were knocked off the hydrogen atoms. The extreme curvature of these paths indicate the strength of the magnetic field in which the bubble chamber is operating.

There has been recent adaptations of techniques very similar to the bubble chamber, using huge tanks of a liquid which scintillates if a particle passes through it. In this case no light source is necessary, for the liquid scintillator produces its own light derived from the energy of the speeding particle.

In this way the smallest known bit of matter has been weighed. It is the neutrino, having no electric charge and weighing about a 2500th that of the electron. The neutrinos originate in atomic reactors, and are produced as all high energy particles strike the targets of the Linac, the AGS and all cyclotrons.

And so with the constant development and refinement of new apparatus, new techniques, new gadgets, man is already over the threshold of a new era. He is one more step further down in the realm of ordered, systematized subdivisions of matter; atomic-nuclear-subnuclear-and now subelectron.



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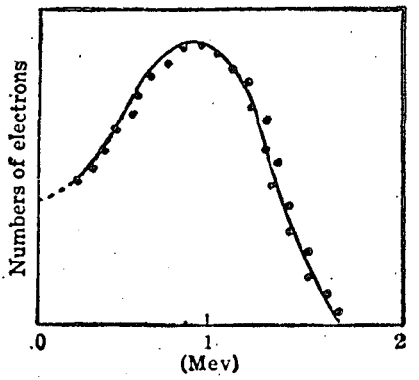

Fig. 1: BETA DECAY OF P^{32}

Showing the relative number of Beta (—) particles given off, with energies between 0 and 1.7 million electron volts (mev). To fit these experimental findings into the framework of known physical principles Fermi (1934) introduced the notion of small particles, neutrinos, with velocities near that of light.

theory to explain the disintegration of radioactive particles which emit beta particles (β^- or e^-). He proposed that a hypothetical particle having little or no mass, be utilized to explain an unusual situation which is encountered in β^- decay studies. It is here that we begin the outline of why science is now engrossed in the laboratory study of *subelectron physics*. The next lower subdivision of matter!

When a radioactive material decays it does so by definite steps; the process and products of such disintegrations are constant, in fact it is this property which makes possible their identification. The rays and particles emitted are the fingerprints of these overactive bits of matter. Most radioactive isotopes decay by emitting electrons, (—) charged "beta particles." But there is one rather disconcerting feature about beta decay; not all the particles come out at the same velocity, and they should. But since they do not Fermi (1932) proposed his theory of the neutrino (a small neutral).

A good example is phosphorus. If we take any phosphorus compound, say the oxide P_2O_5 and place it in an atomic reactor, a certain number of the P atoms adsorb neutrons, and becomes radioactive.

$$P^{31} + n = P^{32}$$

The P^{32} will decay such that one half of the atoms present, at any one time will disintegrate in the next 14.3 days. (half life$=T\frac{1}{2}=14.3$ days).

P^{32} decays to nonradioactive sulfur (S^{32}) yielding beta particles of *maximum* energy of 1.7 million electron volts (mev).

P^{32} (Radioactive)
S^{32} (Stable) (1.7 mev β^-)

Now if all the β^- came off with an energy of 1.7 mev they would all penetrate about half an inch of water. But they do not. In Figure 1 is shown how the distribution varies. Some β^- comes off with almost no energy, while most are somewhat below the maximum of 1.7 mev. To explain this, Fermi made use of Pauli's hypothetical neutral particle, and called it a neutrino. He *guessed*

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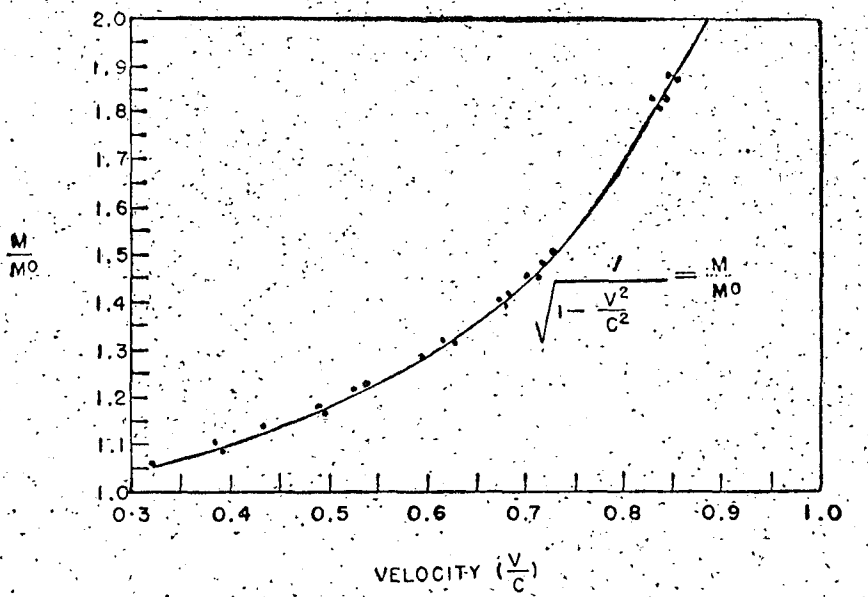

Fig. 2: A plot of the Lorentz equation which has no *mechanistic* explanation although it was deduced nearly seventy years ago.

Ratio of velocity of particle (v) and velocity of light (c) plotted against the increase of weight (or mass). M_o equals the original mass at rest, and M equals the mass of the particle as it reaches some velocity near that of light. The dots represent observed values taken from a number of sources.

(Adapted from "Nuclear Physics," by Irving Kaplan. Addison-Wesley Publishing Company, 1955, p. 98)

that a third party was being kicked out of the nucleus, along with the β, at such a velocity—almost that of light—and of such small mass, that it used up the energy not utilized by the slower much heavier β. In other words he "conserved momentum" so that the energy-mass of a β plus the energy-mass of the corresponding neutrino always equaled the same unit. Many projects have been carried out to study the neutrino, to determine its properties, mass, and velocity. But little is known of it *as yet*. The neutrino now has been assigned a very small mass, and it is said to also result from meson decay, cosmic-ray bombardment, and particle accelerator studies. Several different types of neutrinos have been postulated due to these later investigations.

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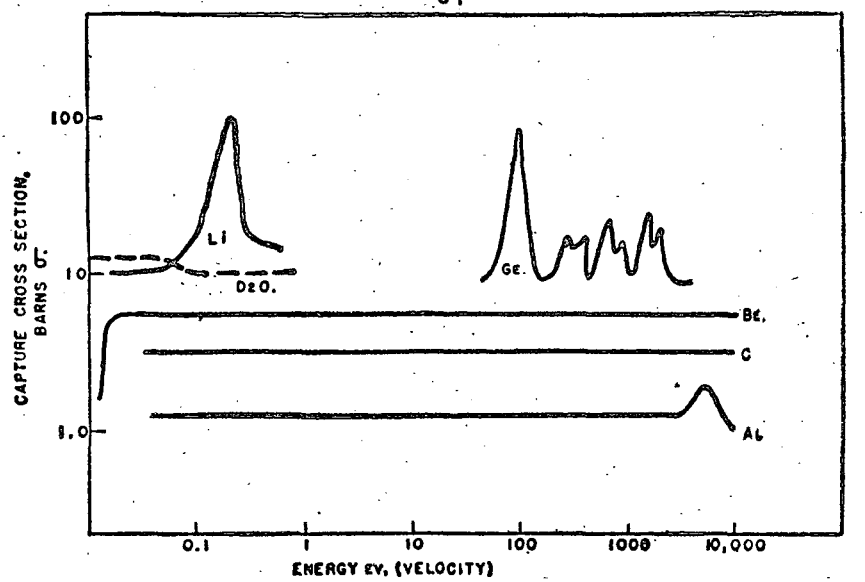
Perhaps in the future, with the other methods which are rapidly developing, these elusive little fellows will also be fingerprinted.

About 1890 the Dutch scientist, H. A. Lorentz, published a theory which stated that an object should grow heavier as it approached the speed of light. But it was several years before any experimental data was obtained which supported this seemingly hair brained idea.

About 1902 Lorentz saw in others'

Fig. 3: Capture cross section varies with velocity of neutron. As the velocity of the neutron matches the velocity of a nucleus, the neutron is readily adsorbed by the atom, forming a new, heavier atom.

The flat, smooth lines indicated for carbon, beryllium, and heavy water (D_2O) show why these materials are used so extensively in atomic reactors. They slow down but only slightly adsorb the neutrons produced by the fission reaction. On the other hand the other elements have one or more points at which they readily adsorb the neutrons as the velocity of the neutrons are brought down to some critical value. Lithium and germanium shown here are typical. However, gold has one peak at 4 ev, where the capture cross section is 30,000 barns (σ). Cadmium has an 8,000 σ peak at 2 ev, and silver a 10,000 σ peak at 5 ev. These three metals soak up neutrons as a sponge does water, and a new heavier atom is formed (each individual atom adsorbs a single neutron) as the velocities of the two interacting particles are *matched*.



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published results confirmations of his theoretical studies. A German, W. Kauffmann published his studies of the ratio of electric charge to mass, e/m, in particles being emitted by the then newly discovered radioactive materials. Electron and beta particles were both (—) charged and both had the same e/m ratio. What was more, the weight ratios as predicted by Lorentz ten years earlier were correct; and to a remarkable accuracy! One prominent nuclear physics text states: "The difficulty with accepting these results was caused by the lack of a consistent physical basis for them, and it became necessary to revise some of the fundamental ideas of physics." (5) In laymen's language the mathematics and guesses may seem off-base but look at the results! (See Figure 2).

About this time a young theoretician considered this problem, along with a host of other questions. In 1905 young Albert Einstein proposed a plausible explanation. The increase in mass is not observable if one is riding on the speeding particle or alongside it at the same velocity. The increase in mass is *relative*, dependent on the difference in the velocity of the particle and the observer. (The special theory of relativity).

The experimental results shown in Figure 2 indicate why the great majority of nuclear scientists believe the mass increase is relative and why Lorentz's mathematical treatment *must* be correct. The observed values fit the theoretical curve in a manner almost unprecedented!

But there is a fly in the buttermilk! Electromagnetic and/or electrostatic apparatus is used to accelerate the charged particle, also to measure its velocity and mass. Examine the simple principles on which these pieces of apparatus operate and you will find that this explanation ignores two basic precepts of physics: the principle of the lever, and Newton's axiom of action/reaction. When one applies a force either to accelerate the particle or to deflect it, this force is applied through some lever/fulcrum arrangement, with the fulcrum transmitting to its base—the earth—the summation of force applied plus the equal and opposite inertial force of the moving particle *. At the instant of measurement the mass increase is real, finite and is independent of velocity or time. Somewhere, somehow the speeding particles have picked up extra mass.

The writer in 1957 became dissatisfied with the mathematical systems and assumptions used in much of modern nuclear theory. As an experiment in hypothesis and theorizing, it was decided to feed the nuclear data of 1950-1960 back into the classical cause-effect theories of the pre-1900s. (4) Thus, developed the idea that the Lorentz equation shown above is not a relationship dependent *only on velocity.*

* If you think that a magnetic field cannot be utilized as the lever or as a fulcrum, loosen the base bolts of an induction motor which is connected to a load, start it and watch what happens. Also observe the operation of a solenoid. Here in greatly enlarged forms is what is happening in our particle accelerators, cathode-ray tubes and the other apparatus used to determine the mass of accelerated particles.

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If there exists a series of particles of matter smaller than the electron, and without electric charge—Pauli's and Fermi's neutrinos—and *if* these are concentrated in an electrostatic and/or electromagnetic field, then the observed increases in mass may not be due to relativistic effect. This phenomenon then appears to be the incorporation of uncharged bits of matter as we *match* velocities. The Lorentz relationship is then a first-order approximation of the captured cross section** of an accelerated particle (e^-, p^+, d^-) for uncharged particles having mass less than the electron, including perhaps particles of mass equal to the electron but uncharged (e°).

The concept of matching velocities is that used to explain neutron capture by various atoms. Our atomic reactors produce high speed neutrons in great profusion by the fission of uranium or plutonium. The moderators—carbon, heavy water, et cetera—serve to slow down the fast neutrons to so-called thermal velocities. At certain specific neutron velocities—called resonance energies—certain atoms will adsorb the neutrons quite readily. In other words, as we *match* the velocity of the two particles they interact, forming an entirely new and *heavier* atom.

Remember that no one has ever seen a neutron, or its track, in a cloud chamber. The presence of the neutron is *deduced* because it is adsorbed, forming some heavier atom, the presence of which is determined only if this atom disintegrates and emits a charged particle or a pulse of energy—a gamma ray. The existence of neutrons are proven indirectly by inferential reasoning.

The above approach was first discussed with nuclear scientists in 1957. In March, 1958, at the New York Academy of Sciences the author heard for the first time laboratory evidence to support his theorizing. During the discussion of his development of a subnuclear periodic table, J. J. Grebe (6) stated that he had obtained sharp jumps or breaks in the classical Lorentz curve as charged particles were more carefully studied in the cyclotron. To this writer, here was supporting evidence. The breaks in the smooth Lorentz curve could indicate resonance energies corresponding to the breaks in the smooth neutron capture curves (7). (Compare Figures 2 and 3).

Thus it may well be that an accelerated particle in one of our atom smashers is adsorbing small increments of uncharged matter as velocities of the interacting particles are matched. Simply stated, this is the neutron theory and mechanism moved down to a lower order of magnitude. Our particle accelerators are not only "guns," they seem also to be electrostatic-electromagnetic balances which first accelerate the charged particles, then weigh them as they adsorb other uncharged bits of matter. And we seem to have an-

** Capture cross section is the size or area of the particle that another particle "sees" as it approaches. It may also be defined as the ability of one particle to adsorb another if the two come close enough.

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other laboratory method studying that series of particles below the electron.

THE "QUASI PARTICLES" OF LIQUID HELIUM

Down, down in temperature, first using liquid hydrogen to get close to absolute zero, and then helium, and we finally reach to just a half degree from absolute zero, 0.5 A°. At 4.0°A, helium acts like any other liquified gas, but at 2.2°A there is a strange transition, and a liquid is formed that has the properties of no other material. This He II does strange things!

There seems to be no gravity, because it crawls up the sides of the container. It leaks out of a crevice through which not even hydrogen *gas* can pass. It seems to dissolve the molecules at the edges of a crack.

But what is strangest of all, if some of this liquid He II, is enclosed in a small mouthed vial at 2.0°A, then heated to 2.2°A, there is emitted a "gas" consisting of what has been called "quasi particles" for want of a better name. They are of unknown mass smaller than the electron, and have no electrical charge. Where they come from or where they go to is a mystery. But they are certainly more than imaginary or "hypothetical".

These "quasi particles" as they pour out of the orifice of a small bottle, cause a vane mounted in front of the bottle to swing away from the jet stream. If the bottle is counterbalanced and pivoted on a fine beam, the vial will rotate due to the momentum of the particles rushing out of the mouth of the vial. A pile of closely packed disks rotated in liquid He II, at 2.2°A entrap the "quasi particles" between the disks causing the mass of the whole unit to increase; this decreases the rate at which the whole pile of disks rotates. These two experiments were conducted by two Russian physicists, Peter Kapitza and E. L. Adronikashvili, who reported their results in the Russian journals of physics. The Russian results have been extended by several other types of experiments conducted by the Universities of California and Chicago, and at the Los Alamos Scientific Laboratory, one of this nation's centers of atomic recearch.

The United States experiments consisted of (1) showing that these "quasi particles" retard the migration of Helium ions, through liquid Helium, under the influence of an electric current, (2) that these particles react with a beam of neutrons, scattering certain of the neutrons and adsorbing some of the neutron's energy. (Exactly as do billiard balls as they collide.) (3) Two rotating cylinders, separated by a thin film of liquid helium, show a marked increase of drag, i.e., friction, at the transition point of 2.2°A, when the "quasi particles" are formed. At higher temperatures the particles seem to disappear, as they do when the temperature goes below 2.0°A.

Thus by many experimental methods carried on by various laboratories, it is certainly evident that man has finally devised methods of studying

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the world of a new type of matter existing at extremely low temperatures, when all molecular activity is essentially at a standstill. (8, 9, 10, 11,).

Examination of the above leads to the conclusion that there may well be a basic law of physics emerging from the mass of new laboratory data, this is a principle which describes the interaction of subnuclear particles brought about by the matching of their velocities. This could well be called the Law of Critical or Matching Velocities.

To summarize: When a high velocity uncharged particle is reduced in velocity by successive collisions with carbon or heavy water as in our reactors, it arrives at certain low velocities, at which it is readily absorbed by certain low velocity atomic nuclei. In reactor physics this is called "resonance energies," at which the "capture cross section" of the atomic nucleus is greatly increased.

In particle accelerators there is a gradual increase in mass as the velocities of *charged* particles approach the speed of light "c". Above 0.9 c, there seem to be certain sharp increases in weight of the speeding particle which do not conform to the theoretical curve. This may indicate the existence of clouds of otherwise undetected high velocity uncharged particles, either uncharged electrons (e°), or uncharged particles below the electron.

At the temperature of liquid Helium, as He II is heated from 2.0 to 3.0°. A some type of uncharged, subelectron particle is emitted, escaping as a "gas," turning a small vane mounted opposite the opening of the vessel. Therefore this type of "quasi particles" are very real, uncharged, are of slight mass, and depend from their emission on a critical condition of temperature, i.e., velocity of movement of the nucleus of He II. We have, therefore, the condition of a *unit of uncharged mass* being released at some critical velocity of a *charged unit of mass.* Several other types of experiments with He II support and extend these findings.

If you pick up recent copies of *Physical Reviews,* the professional physicist's journal, it will be found that beside the subelectron particles mentioned above there are Fermions and Bosons, both mathematically derive "particles" needed to explain some of the unusual results of subnuclear physics. There are also photons, rotons, gravitons, polarons, and perhaps others that escaped the author's notice.

What does all this mean? And why is the finding that there is a new subdivision of matter below the electron so important? Simply because in all presently accepted nuclear theories, used to explain the workaday world of atomic energy, submarine propulsion, et cetera, et cetera, et cetera, *no allowance has been made for this group of particles. And here is the built-in time bomb in all present nuclear theory!*

The theories involving the interaction of positive and negative electrons ($e+$, $e-$ show that mass is

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destroyed and a pulse of pure energy —gamma ray—is emitted. No *uncharged* particle is considered. In all the theories involving the action of anti-matter; where matter is said to be destroyed, there is contained this same assumption. In the explanation of nuclear events, and atomic energy, the basic assumption of that famous equation $E=mc^2$ is that no uncharged subelectron particles are produced. Yet we have now several experimental methods which show that such entities do exist.

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THE END

THE FIRMAMENT OF TIME, by Loren Eiseley. Atheneum. 1960

Page 61:

"Whoever is acquainted with the history of philosophy during the last two or three centuries cannot but admit, that there appears to have existed a sort of secret and tacit compact among the learned, not to pass beyond a certain limit in speculative science. The privilege of free thought so highly extolled, has at no time been held valid in actual practice, except within this limit."

SAMUEL TAYLOR COLERIDGE, 1819

Courtesy of P. Schuyler Miller

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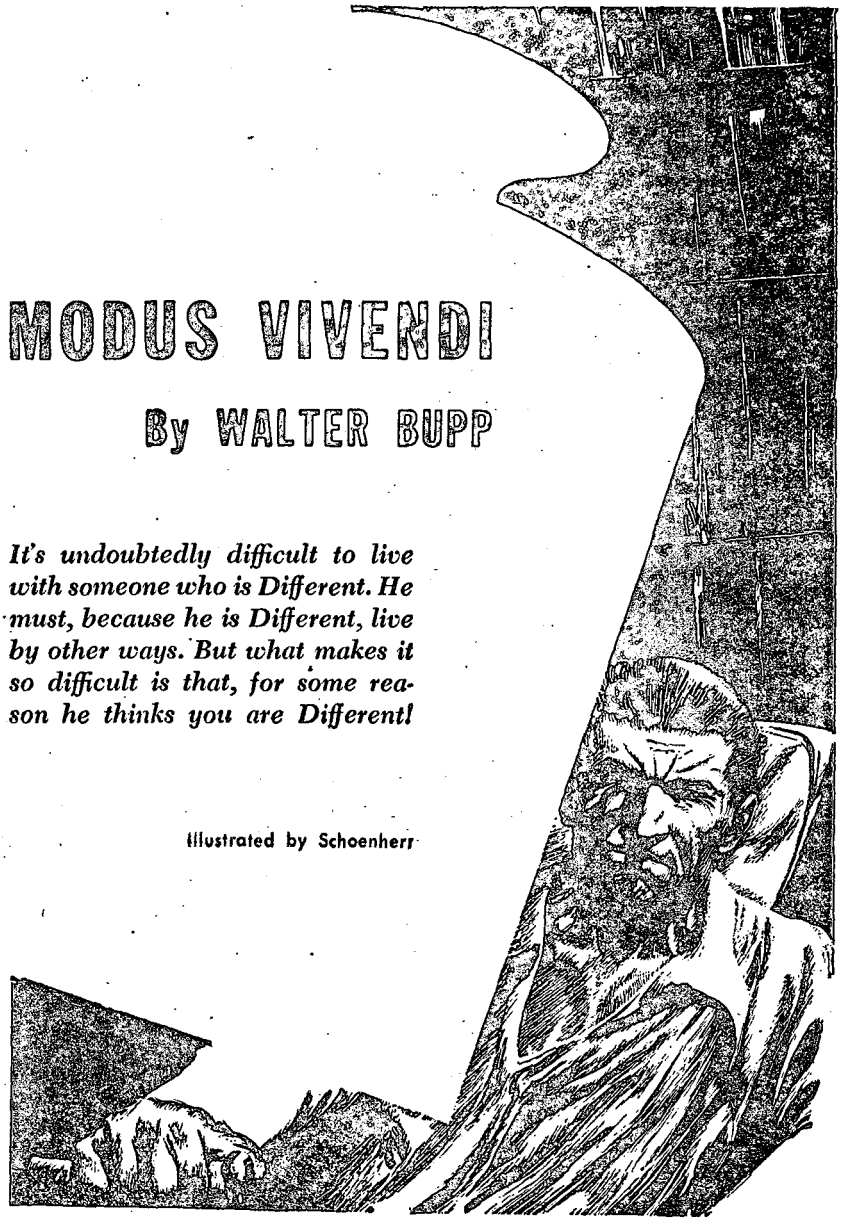
MODUS VIVENDI

By WALTER BUPP

It's undoubtedly difficult to live with someone who is Different. He must, because he is Different, live by other ways. But what makes it so difficult is that, for some reason he thinks you are Different!

Illustrated by Schoenherr



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BY THE time I got to the office, I was jittery as a new bride. The day started out all wrong. I woke up weak and washed out. I was pathetic when I worked out with the weights—they felt as heavy as the Pyramids. And when I walked from the subway to the building where Mike Renner and I have our offices, an obvious telepath tailed me all the way.

I was ready for a scrap. St. Francis himself would have irritated the hell out of me, and I'd have gone speechless with rage at the mere sight of sweet Alice Ben Bolt. The guy sitting with Mike in our law library didn't have a chance.

"What's this?" I growled, seeing Mike seated silent and staring at our caller across the big table. There wasn't a book or sheet of foolscap resting on the walnut. Work hadn't started. They were lying in wait for me. Well, I was lying in wait for the first guy who opened his mouth.

"The Grievance Committee!" Mike said in a tone of stifled fury. "This is Horace Dunn."

"*Carpe Diem.*" I snarled at Horace, a hammered-down heavyweight. "What's Renner done now?"

"Me?" Renner demanded, letting his fat jowls quivver. He's one of these burly types who looks like he should be playing pro ball and instead thrives on showing clients how to keep two sets of books while staying out of jail.

"Not Renner," Horace said. "You, Maragon. The Bar Association gets upset when reputable attorneys successfully defend one of these Stigma cases."

"Forgive me my hobbies," I sneered, sitting down beside my partner. "But I try to win them all. You know I didn't seek that business—Judge Passarelli appointed me Public Defender when that Psi, Crescas, bleated that he was destitute."

Mike Renner apparently decided one of us had to be reasonable. "Coincidence, Dunn," he said. "Pure coincidence. You can't hold it against—"

"No coincidence," I snapped. It wasn't my day to agree with anybody. Renner's fat little eyes opened wide.

"Judge Passarelli *knew* I'd be in his courtroom," I said. "His Honor wanted to get my views on a point I'd made in that pleading the previous week."

"Passarelli *again!*" Horace breathed. "Well, well. What do you know? And two weeks ago he found a Stigma case named Mary Hall 'Not Guilty' of bunco game against the 99th National Bank. You know the case?"

Renner was too upset for speech. He shook his head, looking over at me. I didn't give him the satisfaction. Mike hasn't any patience with my interest in keeping abreast of Psi developments anyway.

"This Mary Hall is a hallucinator," Horace said. He leaned forward and gave it to us in not much more than a whisper. "This witch used her HC to pass five dollar bills off as hundreds, getting change. But they

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caught her at it." He laughed harshly. "And tried her for it," he added. "Get the picture on that 'Not Guilty' verdict?"

"No," Renner admitted. I slouched down, scowling.

"She used HC on Judge Passarelli, too. Foozled his vision, whatever you want to call it. When the 'cutor handed him the evidence, the five dollar bill she had tried to pass for a hundred, all sealed up in plastic, Passarelli *saw* a *hundred,* thanks to her Psi powers."

"Get out of here," I told Horace, getting to my feet.

"Pete! For heaven's sake!" Mike protested. You didn't talk like that to the Grievance Committee. Did you ever see a guy wring his hands? Renner was pathetic.

"Can't you quit pussy-footing around, Renner?" I growled. "This comic isn't from the Grievance Committee!"

Horace Dunn paled on that one. "How do you know that?" he said. He sounded a lot more dangerous.

"Too polite," I sneered. "And it ill becomes you. What's going on?"

"So I level," Horace conceded. "So I'm *not* from the Grievance Committee, and I'm not all hot that Maragon defended Keys Crescas."

"Much better," I said, sitting down again.

"This guy Passarelli is coming up for re-election shortly," our caller said. A light began to dawn. "We're making sure he doesn't make it—and that *our* man does."

My laugh was more a bark. "He can't find Mary Hall," I told Renner.

Horace's lower jaw shot out at me. "I don't like guys who know what I'm thinking!" he snapped.

I had to laugh in his face. "Who needs TP? You want to tar Passarelli with the brush of Psi—and this hallucinator would be Exhibit 'A'."

He subsided. "So I can't find her. What then?"

I shook my head. "You say it," I suggested. "Too early to have to wash my mouth with soap."

Dunn made his big pitch to Renner. "Maragon has a connection with these Psis—it's all over town that he got Keys Crescas off. This Crescas can find Mary Hall—you know how Psis stick together." Renner nodded rapt agreement. "And," Dunn added, finally sticking it in us, "it would be good politics for Maragon to do it—would kind of sweeten up the stench of his getting Crescas off, eh?"

Renner thought he had to sell me: "Pete," he insisted. "You've *got* to! Defending Crescas was sure to hurt our reputation. That girl has it coming for—"

I waved a hand in his face, shutting him up. "Why should I care what happens to the girl?" I said, getting up. "Just make sure Horace pays us a fat fee. After all, it's tax exempt."

"Tax exempt?" he asked, frowning.

"Sure," I said, walking out. "Religious contribution. Thirty pieces of silver."

Keys Crescas is the kind of odd-

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ball you can't find till after dark. Good looking in a romantic, off-beat sort of way. No visible means of support—a typical Psi. Renner made one white-jowled attempt to read me the riot act for failing to plead him guilty when Passarelli had tapped me as Public Defender. I came close to throwing the meat-ball out of my private office.

What could I have done? Sure, Crescas has the Stigma—he doesn't try to hide it. It's only TK, though, and I don't suppose much of that. Just enough, the cops will tell you, to make him a good man at picking locks and earn his nickname—Keys.

People like Crescas run to a pattern. I left my number in about ten of the spots he might turn up, and around six o'clock one of them hit pay dirt.

I pressed the "Accept" key when the phone rang, and Keys Crescas' olive face and curly black hair filled the screen. His black eyes had that lively watchfulness you associate with Psis. He had the gain way down and the aperture wide, so that he wasn't in focus any farther back than his ears. And that 'scope setting hid from where he was calling as effectively as a veil. Did you ever know a Psi who didn't seem to be harboring a secret?

"Hi, Mouthpiece," he grinned, showing even white teeth. "How'd you know where to find me?"

"Best place for worms is under a manure pile," I said. "I used parallel logic."

That took that smug, Stigma grin off his puss. "What do you want?" he asked, sullen now.

"A lead to a Psi who's gone into hiding."

You know what he told me to do. "Mary Hall," I added. "She's got Stigma Troubles."

"Not even counting you, eh?" Crescas sneered. He made the same suggestion again. I let it ride. "Go on," he dared me. "Make your pitch. I'll laugh later."

"That 'Not Guilty' verdict doesn't mean a thing, Crescas," I told him. "That was a National Bank she tried to rob. There's a Federal rap still to be settled. She has big Stigma troubles and needs counsel—and not one of those shysters who hang around the Criminal Courts building sniffing for Psi business."

"She's in no trouble till they find her," he said accurately, and I could see his hand come up to cut the image. "For my dough they've given up trying to find her and are using you for a stalking horse," he added with fiendish accuracy.

"So don't trust me," I snarled. "You can send her saw blades baked in a cake." I reached up, too.

"Hold it."

I stopped, trying to keep my glower going.

"Passarelli would have to be in on it, too," he decided. "And I can't figure *him* for a louse. O.K., Maragon. I'll pick you up at your office at about eight o'clock."

With nearly two hours to kill, I went out to eat. I still felt glum and

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lousy. Part of it was the knifelike penetration of Crescas' intuition—his knowing that I was just a stalking horse so that the big guns could zero in on Mary Hall. And there was that little tremor of fear that comes from knowing that a Psi may think you've doublecrossed him. They have some powerful abilities when it comes to exacting vengeance. Well, if everything about the deal was as much screwed up as the part I had heard so far, I decided, I might get out with a whole skin at that.

That was my attempt at consolation—that and an order of sweetbreads *Financiere,* which is a ridiculous dish for a sawed-off shyster tending toward overweight.

I was back in the law library by ten minutes of eight, trying to occupy my mind with the latest *Harvard Law Review,* when the 'phone rang. Keys' face, a little tight-lipped and bright-eyed, peered at me from the screen, which it completely filled. He must have darned near swallowed the 'scope.

"Ready?" he asked softly.

"Sure. You picking me up?"

His lip curled in half a smile. "What do I look like?" he sneered. "Grab a cab. You know a bar called the Moldy Fig?" I nodded. "That's where." He cut the image.

Well, this was more like it. You can't deal with Psis without the whole affair acting like something out of E. Phillips Oppenheim. I closed up the office, turned out the ceiling, and rode the elevator down to the street.

The night howled and shrieked with airborne traffic. A hot-rodding kid gunned his fans up the street a way and ripped what silence might have remained to the night into shreds as he streaked past me. The jerk wasn't forty feet off the ground, and was pouring the coal to his turbine. The whine of his impellers sounded a strong down-Doppler as his ripped past me, nose dropped a good thirty degrees and dragging every knot he could get out of his 'copter.

I waved to a cab standing at the rank up the block a way and watched the skim-copter rise a couple inches off the ground as the hacker skimmed on the ground-cushion toward me. City grit cut at my ankles from the air blast before I could hop into the bubble and give him my destination. He looked the question at me hopefully, over his shoulder, his hand on the arm of his meter.

"Oh, what the hell," I said, still sore at the world, and a little worried about what I was trying to do. "Let's 'copter!" He grinned and swung the arm over to the "fly" position with its four-times-higher rate. His turbine screamed to a keener pitch with wide throttle, and he climbed full-bore into the down-town slow lane.

The swift ride down to the Village was long enough to induce that odd motion-hypnosis so common in night flight over a metropolitan area. The dizzy blur of red and green running lights from air-borne traffic at levels above and below us, the shapes of

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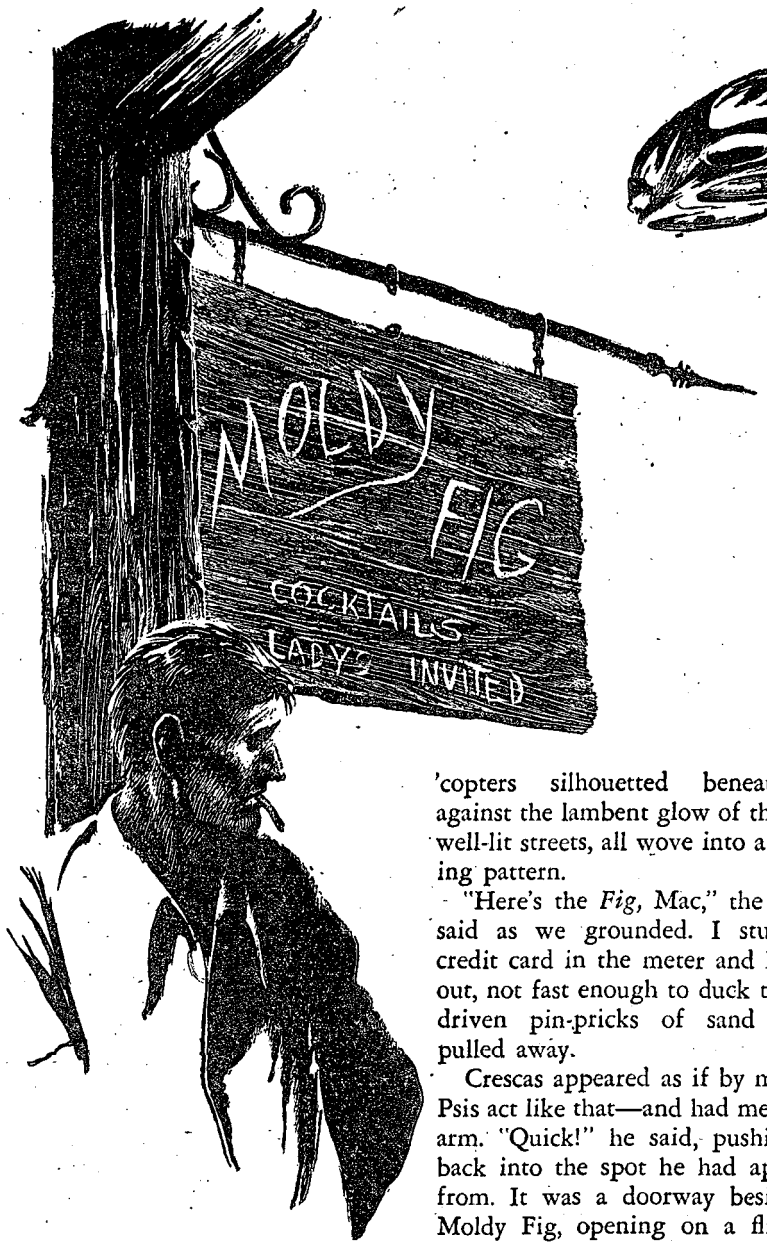

'copters silhouetted beneath us against the lambent glow of the city's well-lit streets, all wove into a numbing pattern.

"Here's the *Fig*, Mac," the hacker said as we grounded. I stuck my credit card in the meter and hopped out, not fast enough to duck the fan-driven pin-pricks of sand as he pulled away.

Crescas appeared as if by magic—Psis act like that—and had me by the arm. "Quick!" he said, pushing me back into the spot he had appeared from. It was a doorway beside the Moldy Fig, opening on a flight of

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steps running to an apartment above the bar. As we climbed the clean and well-lit stairs, I reminded myself that I was probably entering a den of Psis—and clamped down tight on my thoughts. There was plenty they had better not peep.

Keys didn't have to knock on the door—there's always a telepath hanging around these Stigma hideouts who knows who's coming. A husky young man, quite blond and pink of face, opened the door. A soft rustle of music spilled out around his big shoulders. He wore a T-shirt, and his powerful forearms were bare.

"Hey!" he said to Keys, spotting himself as a Southerner as surely as if he'd had the Stars and Bars tattooed on his forehead. We followed him down a short hall into a room furnished with a couple of couches, an easy-chair, several small but delightful tables, and a piano. Here was the music. A blond bombshell was drumming box chords on the ivories, and grouped around her on side chairs were four young men, playing with her. It was jazz, if that's what you call the quiet racket that comes out of a wooden recorder, a very large pottery ocharina that hooted like a gallon jug, a steel guitar and a pair of bongo drums played discreetly with the fingertips.

My appearance stopped them right in the middle of a chorus of "Muskrat Ramble." I'd have liked to hear more—it was Dixieland times two—what the Psis call Psixieland. That's jazz played by a gang of telepaths. Each one knows what the others are about to play. The result is extemporaneous counterpoint, but without the clinkers we associate with jazz. Almost too perfect, yet untrammeled.

My eyes ran around the room as the four men who had been playing with the girl got up and prepared to leave. The place was spotless. Oh, the furnishings weren't costly, but they were chosen with that sense of fitness, of refinement of color and decor that is curiously Psi. I suppose that's one of the little things that annoys Normals so much. Stigma powers seem to go beyond telepathy, clairvoyance and telekinesis—they extend in some hard to define way into the aesthetic. A chaste kind of cleanliness is only part of it. *Taste*, I guess that's the word. Their attire, their homes, everything about Psis, seems tasteful.

In moments only Keys, the blond Southerner and the still blonder bomb on the piano bench were left to face me. Keys poked a finger at the plow-jockey in the T-shirt. "Elmer," he explained.

"Take off yo' hat, Yankee," Elmer grinned. I felt it tipped from my head by his TK.

I glowered at him. "Kid stuff!" I snorted. "So you can lift four ounces from six feet away. But you don't have any idea what incorporeal hereditaments are. Which is better?"

The pink of his face got red. He could have broken me in two.

"Just making a point," I said. "I'm stupid about TK. You're stupid about the law. I figure that makes us even."

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He clamped his mouth shut. I turned back to Keys and the girl I was sure was Mary Hall. "What I came here for—"

"What we *got* you here for," Keys interrupted, "was to set you straight on something." I guess I looked as surprised as I felt. The impossibly blond girl giggled. "Over the phone, Maragon," Keys went on, sitting down on the bench beside the girl, "you said there was a Federal rap hanging over Mary's head on this 99th National Bank fracas."

I nodded.

"The theory being," he went on, "that the law doesn't let anybody with the Stigma get away with a thing, right?"

"Right."

"Then relax. Mary hasn't got the Stigma. Have you, Mary?"

"No," she said. I looked her over more carefully. She was closer to twenty than thirty, round-faced, with blue eyes that were about as impossibly bright as her hair was impossibly white. It could have been a corneal tattoo, but somehow I doubted it. Impossibly red lips made up the patriotic triad of colors—but that was lipstick, pure and simple.

"No Stigma?" I demanded. "I know Psixieland when I hear it, Miss Hall. Don't tell me that wasn't telepathic jazz."

She tossed her short hair-do around. "My side-men were TP's," she conceded. "Why do you think I was playing box chords? They knew what I was playing—I didn't know what they'd play."

Well, some of it was adding up. Still, I had to be sure. "I see. Tell me, Mary, where were your parents on the 19th of April in '75?"

She sat up straight beside Keys on the bench, and her fair face flushed pinkly. "Drop dead!" she told me.

I stood up. "See you in jail," I said, and started for the door.

Elmer had played tackle for Ol' Miss—he sure stopped me in my tracks. "I reckon we ain't through with you yet, Yankee," he grinned. He hurt me with his hands, big as country hams. My stiffened fingers jabbed his T-shirt where it covered his solar plexus, and he dropped back, gasping.

"You could learn a little about fighting, too, Psi," I growled. "And you're through with me if that bottle blonde won't answer my questions."

"Hey!" Keys protested. "Come on, relax. Everybody!" he snapped, as Elmer got his breath back and came in for another tackle. I signaled for a fair catch, and he eased up.

I peered over my shoulder at the girl at the piano. "Well?" I asked her. "Where *were* your parents on the 19th of April in '75?"

Her eyes sought out Keys'. He nodded, dropping his gaze to the floor. "About fifty miles from Logan, Iowa," she said.

"And you don't have the Stigma?" I scoffed.

"Not everybody inside the Logan Ring was affected," she reminded me. "Which is my tough luck. But I *am* being crucified because Mother

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and Dad *were* in the Ring the day the N-bomb went off, whether I have the Stigma or not."

I came back to stand in front of her. "I'm an attorney," I said. "I have an idea what can happen to you if the Courts get hold of you. Right now they can't find you—which must mean you've been hiding." She confirmed that with a nod, biting her red, red lips. "They *are* after you, and a Federal rap is just the start," I said. "You have only one chance, Mary, and I'm glad you claimed it. The only way you can keep them from putting you over a barrel is to prove you don't have the Stigma. I think I know a way to do it. Are you ready to let me help you?"

"Not *that* fast," she said, looking worried. "Oh, I trust Keys' judgment about you. Yes, I *do*," she said earnestly, turning to Crescas. "Yes, I *know* he got you off, Keys. But it doesn't sound right. Why should he take a chance helping a Psi—even if I really *don't* have the Stigma? What's his angle?"

"Fair enough," Keys said. "How about it, Maragon?"

"I knew it was a bum rap they were trying to pin on Mary as soon as I heard about it," I explained. "This business about Mary having HC. There just isn't any such Psi power as hallucination, and every one of you knows it—it's an old wives' tale. I wouldn't touch this little lady with a ten-foot pole if I really thought she had the Stigma. I have a living to make around this town—and you can't handle Stigma business and get any decent trade, too."

I looked back at Mary. "How *did* you work your swindle at the bank?" I asked quietly.

She sighed. "Sleight of hand," she said. "A damned fool stunt. I figured to put the money back in a day or so. If somebody else hadn't been working the same racket, they'd never have caught me. But they had set a trap—"

"I *thought* it was some light-finger stuff," I grinned. "Well, it will take me a while to set up a real test of your Psi Powers. Where can I reach you—or are you spending the night here?"

"Certainly not!" she said, casting an annoyed glance at Elmer. She looked at her watch. "Would it be much longer than an hour? I might still be here, if Elmer—"

"Jes' fine," T-shirt said. "Unless yo' mine watching Keys and me practice." He grinned at me. "Keys is he'ping me build up mah TK," he explained.

"That'll make you popular," I sneered, as I wrote down Elmer's phone number. They let me out. It had been a pretty room, and in a way I hated to leave it. Still, by the time a cruising 'copter had taken me halfway back to my office up-town, I could relax the shield over my thoughts—and that was worth getting out of that Stigma hideaway.

It was a little after nine when I walked into the lobby and rang for the elevator. A man lounging against

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the wall over near the building directory raised a wrist-phone to his mouth and spoke quietly into it as I waited for the car to come. He didn't seem to be interested in me—but then, he wouldn't want to show it if he were. Fool around with the Stigma, would I?

The building was mostly dark—in our circle we make too much dough to be interested in overtime. I keyed myself into our waiting room, turned on the ceiling, and went into my private office. There was enough light leaking in from our foyer, so I added none.

I found Lindstrom at home—after all, he should have been by nine o'clock. "Maragon!" he said. "Kill your focus! I have guests!"

I reached up to twist the 'scope so that my image would be a blur on his screen. Nice beginning. I was as welcome as a thriving case of leprosy.

"I want you to make a test for me, Professor," I said. "Tonight."

He shook his head. "I told you I had guests. We're entertaining. No thanks, Maragon."

"A Normal is being crucified," I said quietly. "They've got her pegged as a Psi. I've got to get her off the hook."

"How could this happen?" he demanded.

"She hangs with a bunch of Stigma cases, for one thing," I said.

"Nobody forced her to associate with a gang of Psis," he said. "Serves her right."

"Nobody forced you to, either, Prof," I snarled. "But you have a steady stream of Stigma cases going through your laboratory."

"That's different!" he protested.

"Nuts. Now name a time when I can see you there."

"I don't want any part of it. If you're along, it will just mean trouble, Maragon. You got too much publicity on defending that TK locksmith. I've got a professional standing to maintain."

"You'd sure look silly if all the Psis in town blackballed you," I snarled at him. "Let me pass the word around—and you darned well know I've got the contacts to do it—and you've tested your last Stigma case. Then let's see what kind of a professional standing you've got."

He knew some pretty dirty words. "What time?" I pressed him, knowing the profanity was a concession of defeat.

"Not before eleven," he said glumly. "I won't forget this, Maragon."

"What the hell," I said. "I'm on every S-list in town already. You hardly count beside the other enemies I'm making." I cut the image.

As if at a signal, there was a tapping on the door to the corridor. I got out of my swivel, walked into the waiting room and opened up. The man who stood there was faintly familiar—but it was the gun in his fist that got most of my attention.

"Maragon?" he asked softly.

I spread my feet a little. "I knew I was making enemies pretty fast," I said to him. "But I didn't know how strongly. Listen," I snapped, "I'll bet one thing never occurred to you."

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He was taken back. You're not supposed to snarl at a guy who pokes a gun at you. In theory it gives him the edge of any conversation. "Huh?" he said.

"The only thing that lousy pop-gun of yours is good for is shooting people. I don't think you came here to shoot me. Now what can you do?"

"Clown," he growled. "Where's Renner?"

"In bed, if he has any sense," I decided. "Make up your mind. Whom do you want?"

"For Pete's sake," he said. "Grammar at a time like this!" He looked down at his gun, decided I was right, and stuck it in a shoulder holster. Then his wrist came up in front of his mouth and I recognized him. It was the man who had lounged near the building directory when I had come in. "Come ahead," he said into the mike.

I turned my back on him and stomped into my office. Let them follow me.

But only one man came in, a minute or so later. "Does it have to be so dark?" he asked politely.

"Rheostat's by your elbow," I said. He reached for it and turned on the ceiling, closing the door that cut us off from the waiting room.

"Good evening, Counselor," he said, taking the seat across my desk from me. He looked different without his judicial robes, not quite as much my senior as I had thought. He wasn't any taller than I was, perhaps five feet nine, and thirty pounds lighter. Between us we had about an average forehead—his went up to the top of his head—my hairline starts about where my eyebrows leave off. Robes or no robes, there was something judicial about him, as though he'd been born with a gavel in his hand.

"Good evening, Your Honor," I said to Judge Passarelli. "You have a pretty active pipeline into Stigma circles, don't you?"

It didn't bother him. "As long as judgeships are elective offices, Maragon," he said. "Judges will play politics. Fill me in on this Mary Hall thing."

"Without violating professional ethics?" I asked.

"You'll try cases again, in front of judges," he snapped not very judicial. "Don't get me angry with you, Maragon."

I countered: "The shoe is on the other foot—I'm darned sore at you." He tried to find his receding hairline with his thin eyebrows. "Don't look so amazed—do you think I haven't figured out my defending that TK Crescas was no accident? You set me up for it."

"Set you up for a resoundingly successful defense," he observed.

"And a resoundingly bad press!" I said. "I have a living to make in this town—"

"Psis are still citizens," he said. "I'm tired of seeing them thrown to the wolves by the jackals who practice law from a phone booth. Psis deserve a decent defense. Without you, Crescas would be in prison."

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"And without *you*," I growled at him. "I might still have a law practice!"

"So you're helping them find Mary Hall—to embarrass me?"

"I've already found her," I said. "Feel embarrassed?"

"Not yet," he conceded. "What are you planning to do?"

"We've accepted a fee to turn her over to a client," I revealed. "I guess that's not unethical to tell you."

"And you'll do that?"

"After one more step."

"And that is?"

"Prove that she hasn't got the Stigma."

"*Hasn't* got it!" He hopped out of his chair and pressed his knuckles on my desk.

"You'd better do a little more research, if you're going to let your black heart bleed over these Stigma cases, Judge," I grinned at him. "All this talk about Mary Hall using HC on your vision. That will never embarrass you. There isn't such a thing as HC—hallucination is an old wives' tale. It was sleight of hand, in the bank and in your courtroom. Don't stand still for that noise about HC."

"I'll be switched," he said. "You're serious?"

"Sure."

He frowned at me. "She's still in trouble," he reminded me. "The Federal Grand Jury—"

"Restitution ought to cure that," I said. "Especially if we threaten a lawsuit for slander—I think it's libelous to claim a Normal has the Stigma. Mutual release all around."

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"You'll represent her?" he asked.

"Would you consider it ethical? I don't see how my assignment to turn Mary Hall over to your political opponents will stop me from representing her in a lawsuit, do you?"

He shook his head, straightening up. "I don't see how," he agreed. "I hope you do defend her, Maragon. The Courts have had to be pretty tough on these pathetic people. If they had reputable representatives, I for one would be a lot more ready to suspend sentences and find other ways to help them out of the jams their weird powers get them into."

"I'll think about it," I said. "In the meantime—stay away from me."

"We're both poison right now," he agreed. "And thanks."

Mary Hall was still at T-shirted Elmer's when I dialed his phone, and she agreed to meet me on the street in front of the Moldy Fig. My 'copter had barely settled to the pavement when she came running from the doorway to the stairs and hopped into the bubble with me.

"Columbia University," I told the hacker. "Rhine Building."

Professor Lindstrom was waiting for us in his laboratory, in carpet slippers and without his tie. "Laboratory" is a perfectly silly term. The "apparatus" in any Psi lab is no more complicated than a folding screen, some playing cards, perhaps a deck of Rhine ESP cards and a slide rule. This place went so far as to sport a laboratory bench and a number of lab stools, on which Lindstrom, Mary Hall and I perched. My egghead Psi expert was barely able to restrain himself—he had some bitter things to tell me.

I beat him to it. "Take that injured glower off your puss," I snapped. "Your business is testing people for their Psi powers. Why shouldn't I call on you for help? What are friends for?"

"For a friend I might," Lindstrom said. "You don't rate that well with me any more."

"I'll try to bear up under it," I told him. "In the meantime, this is Mary Hall, a reputed Psi. Her power is HC."

He was interested in spite of himself. "Hallucination?" he said. "We don't see much of that, Miss Hall. And you claim you can demonstrate this power under controlled conditions?" These eggheads all talk alike.

Mary shook her head. "No, I certainly do not. I'm as Normal as you are, Professor." He sagged slightly in disappointment.

"Well," Lindstrom said. "This is going to be difficult to prove, Miss Hall. Merely by withholding your HC ability, you can act Normal—but what would that prove?"

She turned to me. "I thought you said you had a way to get me off the hook," she protested. "How are we —?"

"Quiet," I told her. "I didn't come up here for a lecture in logic. Especially from a dumb blonde." She started to bristle, but thought better of it.

"It goes like this, Prof," I said.

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"This innocent looking piece of fluff was caught slipping a five-dollar bill to a teller at a bank down town, and asking for change for a hundred dollar bill. She says it was nothing more than sleight of hand. You are an experienced observer. I want you to watch her work her little trick. If she can fool us, and not use Psi, the legal position is that she didn't need Psi to fool the teller." I turned to her. "And the logical principle, Miss Aristotle," I told her, "is equally simple: Occam's Razor. Prefer the simpler explanation. Can you show us how you palmed the hundred and slipped the teller a five?"

"You'll be watching for it," Mary protested, letting those ripe lips pout.

"I suppose the teller wasn't? It's his business to watch the bills when he's making change." I took out my wallet and handed her a one and a five. "Hand me the one and make me think it's the five," I said.

Lindstrom leaned his elbows on the black composition top of the lab bench, watching her narrowly. Mary got down off her stool and came over closer to me, smoothing the two bills in her fingers. The five was on top.

"I'd like change for a five," she said, handing it to me. She worked it three times while we watched.

"Utterly smooth," Lindstrom said. "I didn't see her make the switch."

"Me, too," I agreed. I could see the tension drain from Mary's face. She was prettier when she wasn't worried. She was pretty all the time, when you got right down to it. No wonder she could fool a teller. He probably hadn't taken his eyes off that dazzling smile.

"Is that all?" Lindstrom asked.

"Would you certify that you saw her make these switches, and that Psi was not involved?" I asked him.

"Of course. I don't want to, but, if you call me as a witness, I'll testify to what I saw," he said glumly.

"It may not be necessary," I said. "I really ought to call you, just to teach you some manners, Prof. But then, we all have a right to be a little yellow."

Mary would have preferred to remain in silence as we rode a cab back to the Moldy Fig, and huddled over in her corner of the bubble. There wasn't enough light, that high over the city, to read her expression.

"Here's the strategy," I said, about midtown. "If we can get the Bank to agree to restitution, and to sign an admission that you did not use HC or any other Psi power to work your theft, I think you'll be off the hook. I doubt the Federal Jury will listen to an information."

"I hope you're right."

"This is my business," I growled. "Do you want me to represent you?"

She didn't answer that until the 'copter had grounded in front of the Fig. "All right," she said. "I don't know what you're so mad at all the time, but it doesn't seem to be me. I'd like you to represent me."

I watched her scoot across the sidewalk and run up the stairs to Elmer's place. For some screwy reason I hoped she had another place to hole up for the night. I was get-

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ting as bad as Renner—looking lecherously at the raffish display of shapely leg as the blond bombshell beat it.

I directed my hacker to my apartment, and grabbed the phone in the bubble. The Mobile Operator got me Vito Passarelli at his home. He sounded as if he had already retired.

"This is you know who," I said. "It's late, I know, but we'd better talk before morning. My apartment is the safest spot I can think of. I'm in the Directory."

"Now?"

"Now."

I beat His Honor to my apartment by long enough to hang up my jacket, turn the ceiling on to a dim but friendly glow and get out a bottle of Scotch. Judges don't drink bourbon.

I let Passarelli in when the buzzer sounded. "I'm reasonably sure there are no microphones in this place," I said. "This Mary Hall thing is getting hot—we'd better start taking precautions."

"Always," he said, running a hand over his balding head. His eyes saw the bottle and asked me a question. I threw some of the Pinch Bottle over ice and handed it to him, taking mine neat.

"Here's to crime," he said, sipping the liquor. "What happened?"

I poked a finger at my favorite easy-chair, which Passarelli took. I stood in front of him, still holding my drink. "I got myself in a jam."

"You're talking to the wrong man," he said coldly. "Get yourself a lawyer—a *good* Lawyer."

"You're in it with me, Passarelli."

"Never met you," he said, getting up. "Thanks for the drink." He started for the door.

"That witch has the Stigma after all," I said to his back. That stopped him. He came back and poked his angry face into mine.

"You had her tested?"

"Professor Lindstrom, at Columbia," I told him. "She is slick as a whistle. Lindstrom fell for her yarn that it was sleight of hand—but it was HC. I'd have sworn it didn't exist."

"Well," he said. "Well, well. All right, Maragon. What's the jam you're in?"

"You suggested I should represent her, and I'm going to. But with the Stigma? That's more than I bargained for. You know no reputable attorney can afford to represent a Psi. Not if he wants any Normal business. Too much feeling."

"Going to duck out on her?"

"Damned if I'll welch!" I said, more hotly than I had meant to. "You sure don't seem very shaken up by the news."

"It's not any news to me," Passarelli said tightly. "You forget that I've had first-hand experience with that little lady. She gave me the business right in my courtroom. I'm no credulous egghead like Lindstrom. I know the difference between sleight of hand and an hallucination. She made me see just what she wanted me to see."

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"Now you know why I think you're in the same jam, Judge," I said. "You'll look great running for office, with your opposition telling the public how a Psi foozled your vision. They'll stomp on the loud pedal about how you let her get away with it and wangle a 'Not Guilty' verdict when she was guilty as sin."

"Yes," he agreed. "It's a hot potato, all right."

"There's just one out," I insisted. "That girl would have made restitution long ago if the Bank would have permitted it. And I've been asking myself how come—why should the Bank get sniffy and not want its money back?" That was the right question. He went back to the easy-chair and sat down. His eyes came up to meet mine, and then he held out his glass. I splashed some more Pinch in it.

"Politics, politics," he mourned. "The social workers are after me on this thing. They *want* that girl to be in a jam. They've asked me to work on the Bank, asked that I make sure restitution can't be made. They want the threat of a Federal indictment to hang over her head."

"Why?"

"So she'll agree to my committing her to their care. You know what they try to do—it's the doctrine of sterilization. Remove young Psis from the Psi society—cut them loose from their natural contacts, force them to quit using their powers. It's the same technique they use on narcotic violators, if they aren't too deeply committed to drugs."

"And you are really resisting that?"

"Wouldn't you? Of course I had to tell the Bank to refuse restitution. But do you think Psi is a sickness, like narcotic addiction? Nonsense. Telepathy is no more sickness than the ability to discriminate colors, or hear the tones of a scale. This is equivalent to the color-blind and tone-deaf asking that the rest of us stop perceiving color or hearing the pitch of sound. Ridiculous."

"What is the cure?"

"We could argue all night," he said wearily. Then my buzzer sounded. "Expecting anybody else?" he said, alarmed in an instant.

"I can't think of anybody I'd like to find out that you were here," I said. "Get out of sight." He carried his drink into my bedroom.

Mike Renner was at the door. For a fat-faced bookkeeper with a law degree, he looked pretty grim and formidable.

"You rotten double-crosser," he greeted me. I was the darling of practically everybody in New York that night.

"It happens every time. Now what do you want, Renner?"

"To break your neck," he said. "You have found that Psi, Mary Hall, and you haven't turned her over to Dunn. That's a dirty double—"

"With good reason," I cut in on him. "Do we both have to be idiots? I've just finished having the girl tested. She hasn't got the Stigma, Mike. Dunn will look like a fool trying to pin anything on the Judge."

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"That's not our business. Our fee depends on giving her to Dunn!" He shook a fist in my face when he said that. He just doesn't look the part.

"And the reputation of our firm can very well depend on my successfully representing her, and proving that she hasn't got the Stigma."

"You don't honestly mean you're going to represent that Psi!"

"I just *told* you she hasn't got the Stigma!"

"You are a rotten liar," Renner said, getting dangerously red in the face. "What kind of games are you playing with Passarelli? What has *he* got to do with the reputation of our firm? Don't try to lie," he said sharply. "I know he's here. He's been tailed all night."

That was enough for Passarelli. He came out of the bedroom and walked up to Renner. "Forgive me for saying this, Renner," he said. "But I just hope you have a case in my court. I'll find some way to pin one of your slippery tax frauds to you!"

Renner grew pale. He's conditioned to toady to judges. He didn't have the guts to answer Passarelli, and took it out on me, instead. "Our partnership is dissolved, as of right now," he seethed. He dragged some money out of his pocket and threw it on the rug. "There's your share of the rent. I'm throwing your stuff out in the hall in the morning. The auditors will be there at nine o'clock for an accounting. You won't need that address any longer—only reputable people come to our building." He stormed out.

Passarelli and I faced each other in silence. "Jerk!" I raged at him at last. "You couldn't check to see if you were being followed!"

"I regret that," he said. "But you invited me."

"Don't remind me," I snarled. "What now?"

"I don't know about you," Passarelli said. "But I'm going to start looking out for myself. You're too tricky, Maragon."

"And I suppose you think it's time I ditched Mary Hall, eh?"

"What for?" he said mildly. "You're just one more Criminal Court shyster now—Renner gave you the heave-ho. You might as well defend her, even if I can't work with you."

I could feel my belly tighten with rage. "I thought you'd welcome a reputable attorney who would represent Psis," I reminded him.

"Yes, I suppose I would. Very much."

"All of a sudden I'm not reputable?"

"Reputable?" he sneered. "You've been on every side of this thing. Would you like to explain why you told Renner one thing and me another?"

"Same reason you've been going through some contortions yourself—trying to save my profession and occupation."

"Too tricky for me," Passarelli said.

I measured him with my eyes. "That's not the reason you're walking out of here. What's bugging you?"

"Reading my mind?" he said cold-

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ly. It wasn't the first time I'd been accused of it. "But you're right. You lied to me."

"To you? Not so."

"Oh, yes. How do you know that Mary Hall used HC on you in Lindstrom's laboratory? Nothing but Psi could detect that. You had a TK there with you. Admit it."

"Never," I said. "How did you spot it in your courtroom? If I needed a TK, so did you. What about that?"

"That was different," he argued. "I had the—"

"Nuts," I told him. "Just because I have made as much of a study of Psi as you have, don't blackball me. You going to act the same way if I decide to specialize in Stigma cases?"

"Are you going to?"

"What else is left? I'll never get Normal trade after Renner finishes with me. I come back to it: A reputable attorney representing Psis."

Passarelli paused with his hand on the door. "It would have some interest, I guess," he conceded, "if I thought for a moment you could guarantee the behavior of your clients. But no Normal can, Maragon. That's the curse of the Logan Stigma. Normals are panicked by it. Look at the Bar Association and all the trouble that's gone to just to make sure no one with the Stigma is ever admitted to the Bar. Look at those pathetic social workers—trying to control what they can't even perceive. The color-blind man trying to make sure no one else sees red. No, only Psis will ever be able to make Psis behave. They will have to police themselves, and society is unwilling to give them any standing to do it. This I believe is called a dilemma."

"It's a mess, that's for sure," I said gloomily as he left.

Well, what do you do when the props have been pulled out from under your world? I like to believe that the reasonable man sits down and thinks. That's what I did, anyway. I was a guy with very little left to lose. It was time I bet the limit—shot my wad. There was one possibility . . .

I looked at my watch. It was well after one in the morning. Still, I tried Elmer's place again. He came sleepily to the phone.

"Mary there?"

"Of course not."

"Keys?"

"What if he is?"

"Put him on."

There was a delay, but Keys' romantic good looks replaced Elmer's left-tackle belligerence. "What now?" he asked.

"Do you know where Mary is?" I started.

"Maybe."

"She tell you I'm her attorney?"

"Yes."

"I just found out that she's in twice the trouble I thought before. The kid's a pawn in a fight for power between political oppositions. They'll crucify her gladly, without respect to the merits of the case. Too much is riding on it for justice to wind up triumphant."

"That's what I thought," he said. "She stays under cover."

"Think it over," I suggested. "I'm

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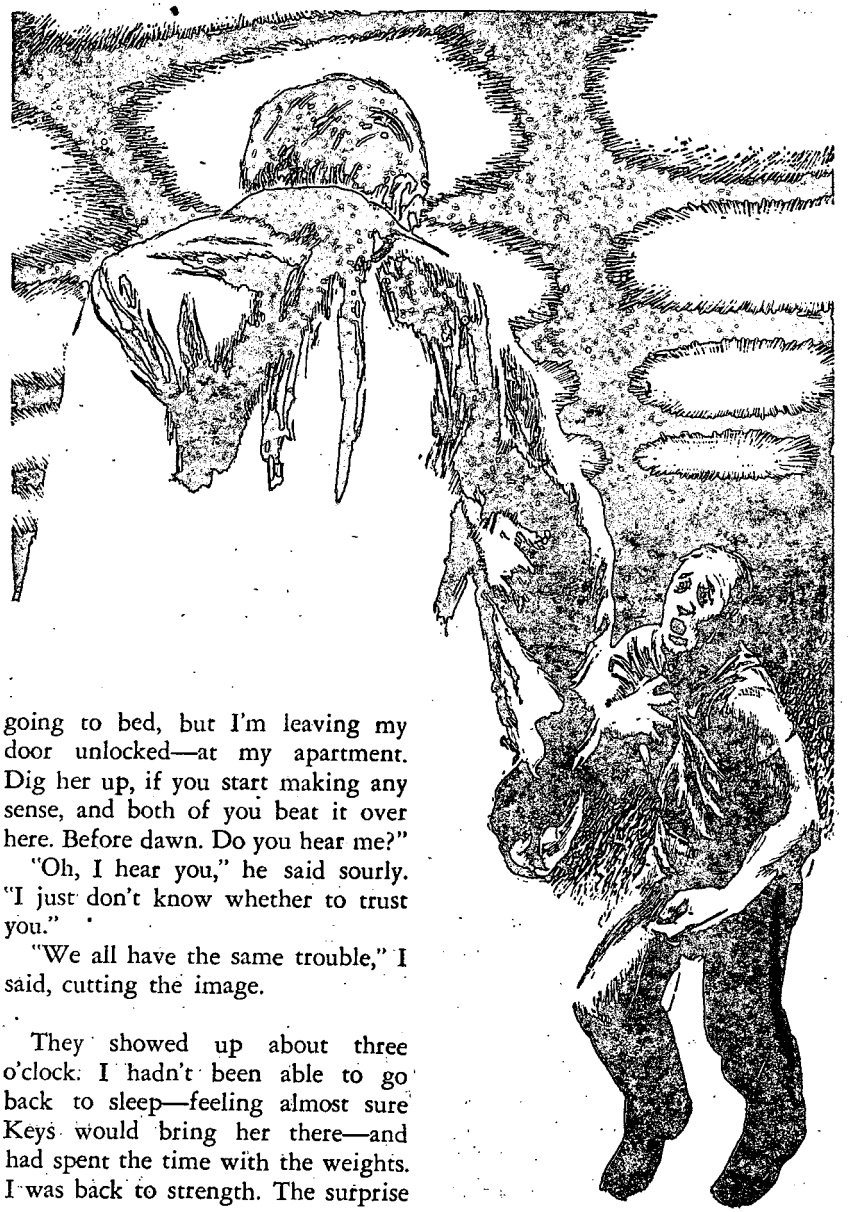

going to bed, but I'm leaving my door unlocked—at my apartment. Dig her up, if you start making any sense, and both of you beat it over here. Before dawn. Do you hear me?"

"Oh, I hear you," he said sourly. "I just don't know whether to trust you."

"We all have the same trouble," I said, cutting the image.

They showed up about three o'clock. I hadn't been able to go back to sleep—feeling almost sure Keys would bring her there—and had spent the time with the weights. I was back to strength. The surprise

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was that Elmer came with them. Well, perhaps it was a help.

Nobody wanted a drink. Mary looked around the apartment a little—it is a nice place, restful and homey, if you can ever achieve that in an apartment fifty floors up.

"A Psi decorated this place," she said. Well, she was right, and I admitted it to her with a nod. "What couldn't wait until morning, Maragon?" she asked me.

"First, Mary, I want you to know that while you fooled Lindstrom, you didn't fool me. You have the Stigma. Wait," I said, raising my hand as she started to protest. "Lies won't do any longer. The chips are down. You wouldn't even be here if the Council of the Lodge hadn't decided it was time to protect you."

Keys took it away from her. "Lodge? What Lodge?"

"We'll come to that," I promised. "First, let's cut away the underbrush. Yes or no. Does she have the Stigma?"

He sought out her eyes, and the way they dropped to my rug I knew that the subterfuge was over. "Yes," he said in a strained, thin voice. "Mary has the Stigma."

"And it is HC?"

All three of them nodded, and Mary's head came up with an odd sort of pride. Well, she should have been proud—for all I could find out, she was unique.

"All right," I said. "And now you can get out of my easy-chair, Elmer. I'd like to sit there." He was obviously surprised by my bad manners. "Get out!" I growled. "It's time you pups got used to taking orders. You'll get your bellies full of it from now on."

"From you?" Elmer scoffed. "Ah reckon not, suh!" But he got out of the chair, and I sat in it.

"Oh, yes you will," I said. "The Lodge will see to that."

"The Lodge again," Keys protested.

"Never heard of it, did you?" I taunted him. "Proof positive that you're small potatoes in Stigma circles. Well, get set for a shock: I represent an organization of Psis—an organization devoted to protecting Stigma cases from Normal society, an organization devoted to establishing discipline among Psis so that our conflicts with Normals are kept to a reasonable minimum."

"And you call this a Lodge?" Mary Hall said. "What's its full name?"

"No other," I said. "It's . . . well, it's a sort of benevolent and protective order. It's as secret as Psis can make anything—a select group."

"I'll bet," Keys sneered. "No TP's in it," he said, reminding me that telepaths can't close their minds to the peeping of other TP's.

"Unfortunately, none," I agreed. "We are getting ready, however, to extend membership beyond the TK's, CV's and HC's who are now enrolled."

"I don't believe it," Mary said. "There aren't any other hallucinators!"

"None foolish enough to reveal it," I conceded. "You had to louse us

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up there—I wonder if any other Stigma power is as feared by Normals? Certainly they're making a Roman circus over you."

Elmer stood up. "Ah've had enough," he said.

"One thing," I said to him. "The Lodge has a rule that no Psi may use his powers to the detriment of a Normal, or reveal the existence of the Lodge. Our discipline is formidable, Elmer. Remember what I say."

Keys was frowning in thought. "Wait a minute, Elmer," he said. "Let me try this one on him for size." He turned to me. "Are you trying to tell me that you are a part of this Lodge, Maragon?"

"I'm their counsel," I said.

"A Normal?" he demanded. "It would make sense for Psis to get together—I've often wondered why it has never worked out more formally than it has. But to trust a Normal to represent them? Never!"

I grinned at him. "Know any attorneys with the Stigma?" I demanded. "I know darned well you don't. The Bar Association screens every would-be lawyer from the moment he enters law school. No, sir. The Lodge had no choice. They picked on me as an attorney sympathetic with Stigma Troubles, and trustworthy."

"You make it sound good," Keys admitted. "But then I know you are a liar." He looked over at Mary Hall. "Although you can prove different if you're able."

I raised an eyebrow at him.

"Tell me how you knew Mary hadn't used sleight of hand in Lindstrom's laboratory," he demanded.

There was nothing I could say. I bit down on my teeth. Well, I had decided to shoot the wad if I had to. He'd called my bet.

"I'll tell you, Maragon," he said. "I hate to admit it of a skunk like you, but you've got the Stigma. You kept a TK grip on those bills she shuffled. Her hallucination is too good for you not to think it was sleight of hand."

"No!" Mary shrieked.

"Not him!" Elmer said.

I stood up to face them. "Yes," I said. "I *do* have the Stigma. The only lie was that I was the Lodge's counsel. I'm not."

"What then?" Keys demanded.

"I'm Grand Master of the Manhattan Chapter," I told him. "And you, like every Psi who is made aware of the existence of the Lodge, are now subject to my orders."

"Not me," Elmer said. "You ain't got the Stigma."

I fired a lift at an ashtray on the table beside him, and it sailed in an arc toward the kitchen and crashed against the wall. My TK was certainly a lot better than it had been in the morning. Well, I'd spent an hour or so warming up before they had come in.

"*Who* hasn't got the Stigma?" I said.

He looked at Keys. "You didn't do that," he said. "You *couldn't!*"

Keys was openmouthed. "What a bruiser!" he marveled.

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"So I've got the Stigma, Elmer," I said quietly. "Now why won't you do what I tell you?"

"Ah don't do what *anybody* tells me!"

"What do you hate and fear the most?" I asked him.

"Snakes, ah reckon," he decided.

"Show him a snake, Mary," I said. Her face twisted in indecision. I rammed a lift in under her heart—I know it hurt her. "Show him!" I snapped.

Elmer didn't jump more than three feet. Mary gave all of us the same hallucination. Her first try was a pretty sad kind of a snake, but it was bigger than the nine-by-twelve rug it squirmed on, and was making right for Elmer's legs, hissing in a horrible fashion.

"Enough," I said. "That's how, Elmer. And if that doesn't trouble you, how about this?" I gave him a sample of what TK means when it's clamped on the mitral valve. A heart attack is no joking matter, and just before he hit the deck I eased off.

"Now," I said, "will you do what I tell you, or do I have to kill you outright?"

He sank down to his knees, resting his palms on the carpet so recently vacant of illusory snake. "Yo' got me convinced, suh," he admitted. "No mo', you hear?"

"Any more protests?" I said. I got none. "Here's what we have to do," I went on, and spelled it out for them. At last they were ready to go, three shaken young people. "I repeat—absolute secrecy—none of you is a telepath, so only your lips can give you away if you keep your thoughts screened around TP's. Later that may change—the Lodge is preparing to come a little more into the open with Psis."

My whole membership nodded and left me. I was shaking from head to foot.

We had things to do in the forenoon, and I didn't try to see His Honor Judge Vito Passarelli until after lunch. But the docket was crowded, and there was no chance until after court had adjourned, which was well on toward four o'clock. His Honor was hanging his robes on a clothes-tree as I came into his Chambers, and he nodded me politely to a chair, just as if our last words hadn't been pretty heated.

"Mary Hall?" he asked, fumbling around to find his in-Chambers glasses. He's too vain to wear them on the bench.

I nodded an answer to his question as he came back to take a creaky horse-hair swivel, relic of more judges and years than I like to think about. "I'm here as her counsel," I said.

"What else?" he asked mildly, taking the lid off a big humidor on his desk and starting to fill a pipe.

"We'd like you to know that Mary has joined an organization that should do for her all that the social workers would like to see done for her. She's no longer a behavior problem for Normal society."

"Quite some organization," he said, showing interest. "What one?"

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"It has no formal name," I said. "Being a secret organization. In point of fact, it's an organization of Psis that is revealing itself for the first time."

"Odd that I never heard of it," Passarelli said, looking at his fingernails. He puffed smoke around the stem of his pipe. His coolness bothered me. He should have been much more excited about what I was saying. I threw my high hard one.

"This organization exercises a formidable discipline over its members," I went on. "One of its firm rules is that no Psi may use his powers to the detriment of a Normal."

He chuckled softly. "You're taking advantage of what I told you yesterday, Maragon," he said calmly. "You know, and I know, that Psis have never done any such thing. And if they had, why would they pick you to run their errands? What Psi would ever trust a Normal?"

It was getting sticky. I was skating perilously close to the brink—once I revealed to a Normal that I had the Stigma, my days as an attorney were done. "This organization—I'll call it the Lodge, if I may—has to have an attorney to represent it in Court. And you know as well as I do they can't hire a Psi attorney—the Bar Association has taken care of that. They came to me because . . ."

"Yes, yes," he interrupted, taking his eyes off his nails, and showing some real interest at last. "If you only knew how much I want to believe you, Maragon. But I will *never* believe that Psis would permit themselves to be represented by a Normal. Too bad, but the social workers, and not your mythical Lodge, will get Mary Hall. That or a Federal Grand Jury."

Well, this was the fork in the road, I had been kidding myself, and now I knew it. Persist in my masquerade as a Normal, and I'd never get Mary off the hook. But reveal myself as a Psi, and I was through as an attorney. It really wasn't much of a decision—I had made it when I revealed myself to Keys, Mary and Elmer.

I looked at the humidor of tobacco on his desk. Without changing expression, I aimed a lift at it. The container came up smoothly from the polished walnut and hovered in the air before us.

Passarelli looked at it blandly. I don't think anything in my life has ever been a greater shock than his unconcern. He should have dropped his teeth. Slowly I let the lift break, and lowered the humidor to his desk.

"Fairly good TK, if that's all you're capable of," Passarelli said. "Or can you do better, Maragon?"

"You slimy Normal!" I exploded. "You *tricked* me into exposing myself!"

"What am I, an idiot?" he snapped. "I had to know."

I stood up. "Until now, I never really hated Normals," I began.

"Oh, sit down, for Heaven's sake," he said testily. "Now don't get emotional and lose all your perspective. Doesn't it occur to you that there's been just too much coincidence in this whole thing?"

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I think the word for it is "collapsed." I fell back into my chair. "You'll have to spell it out." I said.

Passarelli leaned forward, his face concentrated, almost angry. "You have the Stigma, you admit it?"

"Of course I admit it."

"You think any other attorney is a Psi?"

"No. I certainly do not. It's only a miracle that I ever got through the screening and made it."

"And yet you, the only attorney with the Stigma, gets tapped to be Public Defender for a Stigma case—Keys Crescas. Doesn't this strike you as more than coincidence can account for?"

"Now it does," I admitted. "Are you trying to tell me . . ."

"I'm telling you I've been suspicious of you for a long time, Pete," Passarelli said. "Perhaps you didn't know it, but I was one of the young attorneys on the Committee from the Bar Association that checked your heredity. No, you were born in San Francisco. No, your parents didn't live in the Logan Ring—their home was in Sausalito. But—the day that neutron bomb was accidentally fired and started the rash of Psi mutations in the ring outside the fatal area centering on Logan, your parents were in a jet airliner. I found that out—and kept my mouth shut. I never told the rest of the Committee that on the 19th of April in '75 that jet was over Iowa, en route to San Francisco, and possibly close enough to Logan for its passengers to have been affected by the neutron spray. Even then I knew the law was painting itself into a corner with its attitude toward Psi. I hoped. I hoped you *did* have the Stigma, and I've waited my time to force you into the open."

"Stinking Normal!"

"Stop acting like a child. I said I *hoped!*"

"Hoped?"

"Yes. I meant what I said about wishing there were a responsible organization of Psis we could turn to. Are you serious about this organization, this Lodge?"

"I guess I am," I said, shaken.

"How many members does it have?"

"It's a secret organization," I protested.

"How many members?"

"Four, including me."

He shrugged. "You start somewhere. Mostly with a man you can trust, and I trust you, Maragon. You can keep this girl in line?"

"Our discipline is formidable," I reminded him, trying a grin. It was pretty sick.

"I'll bet," he grinned back. "Well, it had better be, for I'm going to take a chance on you. Sooner or later the law will have to admit the existence of Psi. I know as well as you Stigma cases that this gene is dominant—that there'll be more Psis every generation. We've got to find some common ground between the two societies—some way to get along. Give me your personal surety in this Mary Hall thing. As an attorney, you're an officer of the Court, and I guess I

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have the right to make her your responsibility. I certainly don't want it getting out that I'm playing footsie with an organization of Psis—this is an elective office, after all."

"After all," I agreed. "But I am glad to hear you sounding like a politician again."

"We'll have to keep our dealings off the record," Passarelli insisted. "But if I thought I could call on you when we get one of these sticky Psi cases before the Courts . . ."

You'd recruit for the Lodge, I thought to myself. "You've got yourself a deal, Your Honor!" I said fervently.

"Call it a *modus vivendi*," he smiled. "Now my big problem is to find a way to eat my words, and let the 99th National Bank accept restitution of what Mary Hall stole from them."

"No sweat," I grinned, beginning to feel better. "It's already been done."

"Done? How could it be? I told the bank not to . . ."

"You told them," I conceded. "But they had no choice, Your Honor. Mary Hall went to the 99th National Bank this morning and asked for change of a five dollar bill."

"What!"

"And passed to the teller a hundred dollar bill. After all HC works both ways. They've got their money back. By noon they had half a dozen IBM technicians in there trying to figure why they were out of balance!"

THE END

THE ANALYTICAL LABORATORY

Reader votes on the June, 1961 issue give the 1¢ a word bonus for satisfying readers to Lloyd Biggle, Jr., and the ½¢ a word bonus to Clifford D. Simak. This voting on stories is rather naturally of the greatest interest to authors; they'd appreciate your post cards. And, equally naturally, it's of the greatest interest to me, too. After all, in essence my business is trying to guess—about six months ahead of time—what you readers are going to like when it's published!

The score for the June issue was:

PLACE	STORY	AUTHOR	POINTS
1.	Monument	Lloyd Biggle, Jr.	1.53
2.	The Fisherman (Pt. 3)	Clifford D. Simak	2.28
3.	Fallen Angel	Philip E. High	3.21
4.	Prologue to an Analogue	Leigh Richmond	3.34
5.	Apollonius Enlists	L. Sprague de Camp	4.42

The Editor.

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FIFTY PER CENT PROPHET

By DARREL T. LANGART

That he was a phony Swami was beyond doubt. That he was a genuine prophet, though, seemed . . . but then, what's the difference between a dictator and a true prophet? So was he . . .

Illustrated by Schoenherr

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DR. JOACHIM sat in the small room behind his reception hall and held his fingers poised above the keys of the rather creaky electrotyper on his desk. The hands seemed to hang there, long, slender, and pale, like two gulls frozen suddenly in their long swoop towards some precious tidbit floating on the writhing sea beneath, ready to begin their drop instantly, as soon as time began again.

All of Dr. Joachim's body seemed to be held in that same stasis. Only his lips moved as he silently framed the next sentence in his mind.

Physically, the good doctor could not be called a big man: he was broad-shouldered and well-muscled, but, hidden as his body was beneath the folds of his blue, monkish robe, only his shortness of stature was noticeable. He was only fifty-four, but the pale face, the full, flowing beard, and the long white hair topped by a small blue skullcap gave him an ageless look, as though centuries of time had flowed over him to leave behind only the marks of experience and wisdom.

The timelessness of an idealized Methuselah as he approached his ninth centennial, the God-given wisdom engraved on the face of Moses as he came down from Sinai, the mystic power of mighty Merlin as he softly intoned a spell of albamancy, all these seemed to have been blended carefully together and infused into the man who sat behind the typer, composing sentences in his head.

Those gull-hands swooped suddenly to the keyboard, and the aged machine clattered rapidly for nearly a minute before Dr. Joachim paused again to consider his next words.

A bell tinkled softly.

Dr. Joachim's brown eyes glanced quickly at the image on the black-and-white TV screen set in the wall. It was connected to the hidden camera in his front room, and showed a woman entering his front door. He sighed and rose from his seat, adjusting his blue robes carefully before he went to the door that led into the outer room.

He'd rather hoped it was a client, but—

"Hello, Susan, my dear," he said in a soft-baritone, as he stepped through the door. "What seems to be the trouble?"

It wasn't the same line that he'd have used with a client. You don't ask a mark questions; you tell him. To a mark, he'd have said: "Ah, you are troubled." It sounds much more authoritative and all-knowing.

But Cherrie Tart—*née* Sue Kowalski—was one of the best strippers on the Boardwalk. Her winters were spent in Florida or Nevada or Puerto Rico, but in summer she always returned to King Frankie's *Golden Surf,* for the summer trade at Coney Island. She might be a big name in show business now, but she had never forgotten her carny background, and King Frankie, in spite of the ultra-ultra tone of the *Golden Surf,* still stuck to the old Minsky traditions.

The worried look on her too-per-

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fect face had been easily visible in the TV screen, but it had been replaced by a bright smile as soon as she had heard Dr. Joachim opening the door. The smile flickered for a moment, then she said: "Gee, Doc; you give a girl the creepy feeling that you really *can* read her mind."

Dr. Joachim merely smiled. Susan might be with it, but a good mitt man doesn't give away *all* his little secrets. He had often wished that he could really read minds—he had heard rumors of men who could—but a little well-applied psychology is sometimes just as good.

"So how's everything been, Doc?" She smiled her best stage smile—every tooth perfect in that perfect face, her hair framing the whole like a perfect golden helmet. She looked like a girl in her early twenties, but Dr. Joachim knew for a fact that she'd been born in 1955, which made her thirty-two next January.

"Reasonably well, all things considered," Dr. Joachim admitted. "I'm not starving to death, at least."

She looked around at the room—the heavy drapes, the signs of the zodiac in gold and silver, the big, overstuffed chairs, all designed to make the "clients" feel comfortable and yet slightly awed by the ancient atmosphere of mysticism. In the dim light, they looked fairly impressive, but she knew that if the lights were brighter the shabbiness would show.

"Maybe you could use a redecorating job, then, Doc," she said. With a gesture born of sudden impulse, she reached into her purse and pulled out an envelope and pressed it into the man's hands. He started to protest, but she cut him off. "No, Doc; I want you to have it. You earned it.

"That San Juan-New York flight, remember?" she went on hurriedly. "You said not to take it, remember? Well, I . . . I sort of forgot about what you'd said. You know. Anyway, I got a ticket and was ready to go when the flight was suddenly delayed. Routine, they said. Checking the engines. But I'd never heard of any such routine as that. I remembered what you told me, Doc, and I got scared.

"After an hour, they put another plane into service; they were still working on the other one. I was still worried, so I decided to wait till the next day.

"I guess you read what happened."

He closed his eyes and nodded slowly. "I read."

"Doc, I'd've been on that flight if you hadn't warned me. All the money in the world isn't enough to pay for that." The oddly worried look had come back into her eyes. "Doc, I don't know how you knew that ship was going to go, and I won't ask. I don't want to know. But . . . one thing: Was it *me* they were after?"

She thinks someone blew up the ship, he thought. *She thinks I heard about the plot some way.* For an instant he hesitated, then:

"No, Susan; they weren't after you. No one was trying to kill you. Don't worry about it."

Relief washed over her face. "O.K., Doc; if you say so. Look, I've got to

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run now, but we've got to sit down and have a few drinks together, now that I'm back. And . . . Doc—"

"Yes?"

"Anytime you need anything—if I can ever help you—you let me know, huh?"

"Certainly, my dear. And don't you worry about anything. The stars are all on your side right now."

She smiled, patted his hand, and then was gone in a flash of gold and honey. Dr. Joachim looked at the door that had closed behind her, then he looked down at the envelope in his hands. He opened it gently and took out the sheaf of bills. Fifteen hundred dollars!

He smiled and shoved the money into his pocket. After all, he *was* a professional fortuneteller, even if he didn't like that particular label, and he *had* saved her life, hadn't he?

He returned to the small back room, sat down again at the typer, and, after a minute, began typing again.

When he was finished, he addressed an envelope and put the letter inside.

It was signed with his legal name: *Peter J. Forsythe.*

It required less than two hours for that letter to end up at its destination in a six-floor brick building, a rather old-fashioned affair that stood among similar structures in a lower-middle-class section of Arlington, Virginia, hardly a hop-skip-and-jump from the Pentagon, and not much farther from the Capitol.

The letter was addressed to *Mr. J. Harlan Balfour, President, The Society for Mystical and Metaphysical Research, Inc.,* but Mr. Balfour was not at the Society's headquarters at the time, having been called to Los Angeles to address a group who were awaiting the Incarnation of God.

Even if he had been there, the letter wouldn't have reached him first. All mail was sent first to the office of the Executive Secretary, Mr. Brian Taggert. Most of it—somewhat better than ninety-nine per cent—went directly on to Mr. Balfour's desk if it was so addressed; Brian Taggert would never have been so cruel as to deprive Mr. Balfour of the joy of sorting through the thousands of crackpot letters in search of those who had the true spark of mysticism which so fascinated Mr. Balfour.

Mr. Balfour was a crackpot, and it was his job to take care of other crackpots—a job he enjoyed immensely and wholeheartedly, feeling, as he did, that that sort of thing was the only reason for the Society's existence. Of course, Mr. Balfour never considered himself or the others in the least bit crackpottish, in which he was just as much in error as he was in his assumption of the Society's *raison d'être.*

Ninety per cent of the members of the Society for Mystical and Metaphysical Research were just what you would expect them to be. Anyone who was "truly interested in the investigation of the supranormal", as the ads in certain magazines put it, could pay five dollars a year for membership, which, among other things,

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entitled him to the Society's monthly magazine, *The Metaphysicist,* a well-printed, conservative-looking publication which contained articles on everything from the latest flying saucer report to careful mathematical evaluations of the statistical methods of the Rhine Foundation. Within its broad field, the magazine was quite catholic in its editorial policy.

These members constituted a very effective screen for the real work of the society, work carried on by the "core" members, most of whom weren't even listed on the membership rolls. And yet, it was this group of men and women who made the Society's title true.

Mr. Brian Taggert was a long way from being a crackpot. The big, dark-haired, dark-eyed, hawknosed man sat at his desk in his office on the fifth floor of the Society's building and checked over the mail. Normally, his big wrestler's body was to be found quietly relaxed on the couch that stood against a nearby wall. Not that he was in any way averse to action; he simply saw no virtue in purposeless action. Nor did he believe in the dictum of Miles Standish; if he wanted a thing done, he sent the man most qualified to do it, whether that was himself or someone else.

When he came to the letter from Coney Island, New York, he read it quickly and then jabbed at a button on the intercom switchboard in his desktop. He said three syllables which would have been meaningless to anyone except the few who understood that sort of verbal shorthand, released the button, and closed his eyes, putting himself in telepathic contact with certain of the Society's agents in New York.

Across the river, in the Senate Office Building, a telephone rang in the office of Senator Mikhail Kerotski, head of the Senate Committee on Space Exploration. It was an unlisted, visionless phone, and the number was known only to a very few important officials in the United States Government, so the senator didn't bother to identify himself; he simply said: "Hello." He listened for a moment, said, "O.K., fine," in a quiet voice, and cut the connection.

He sat behind his desk for a few minutes longer, a bearlike man with a round, pale face and eyes circled with dark rings and heavy pouches, all of which had the effect of making him look like a rather sleepy specimen of the giant panda. He finished the few papers he had been working on, stacked them together, rose, and went into the outer office, where he told his staff that he was going out for a short walk.

By the time he arrived at the brownstone building in Arlington and was pushing open the door of Brian Taggert's office, Taggert had received reports from New York and had started other chains of action. As soon as Senator Kerotski came in, Taggert pushed the letter across the desk toward him. "Check that."

Kerotski read the letter, and a look of relief came over his round face. "Not the same typewriter or paper,

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but this is him, all right. What more do we know?"

"Plenty. Hold on, and I'll give you a complete rundown." He picked up the telephone and began speaking in a low voice. It was an ordinary-sounding conversation; even if the wire had been tapped, no one who was not a "core" member of the S.M.M.R. would have known that the conversation was about anything but an esoteric article to be printed in *The Metaphysicist*—something about dowsing rods.

The core membership had one thing in common: *understanding.*

Consider plutonium. Imagine someone dropping milligram-sized pellets of the metal into an ordinary Florence flask. (In an inert atmosphere, of course; there is no point in ruining a good analogy with side reactions.) More than two and a half million of those little pellets could be dropped into the flask without the operator having anything more to worry about than if he were dropping grains of lead or gold into the container. But after the five millionth, dropping them in by hand would only be done by the ignorant, the stupid, or the indestructible. A qualitative change takes place.

So with understanding. As a human mind increases its ability to understand another human mind, it eventually reaches a critical point, and the mind itself changes. And, at that point, the Greek letter *psi* ceases to be a symbol for the unknown.

When understanding has passed the critical point, conversation as it is carried on by most human beings becomes unnecessarily redundant. Even in ordinary conversation, a single gesture—a shrug of the shoulders, a snap of the fingers, or a nose pinched between thumb and forefinger—can express an idea that would take many words and much more time. A single word—"slob," "nazi," "saint"—can be more descriptive than the dozens of words required to define it. All that is required is that the meanings of the symbols be understood.

The ability to manipulate symbols is the most powerful tool of the human mind; a mind which can manipulate them *effectively* is, in every sense of the word, truly human.

Even without telepathy, it was possible for two S.M.M.R. agents to carry on a conversation above and around ordinary chit-chat. It took longer, naturally; when speaking without the chit-chat, it was possible to convey in seconds information that would have taken several minutes to get over in ordinary conversation.

Senator Kerotski only listened to a small part of the phone discussion. He knew most of the story.

In the past eight months, six anonymous letters had been received by various companies. As Taggert had once put it, in quotes, "We seem to have an Abudah chest containing a patent Hag who comes out and prophesies disasters, with spring complete."

The Big Bend Power Reactor, near Marfa, Texas, had been warned that their stellarator would blow. The let-

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ter was dismissed as "crackpot," and no precautions were taken. The explosion killed nine men and cut off the power in the area for three hours, causing other accidents due to lack of power.

The merchant submarine *Bandarlog,* plying her way between Ceylon and Japan, had ignored the warning sent to her owners and had never been heard from again.

In the Republic of Yemen, an oil refinery caught fire and destroyed millions of dollars worth of property in spite of the anonymous letter that had foretold the disaster.

The Prince Charles Dam in Central Africa had broken and thousands had drowned because those in charge had relegated a warning letter to the cylindrical file.

A mine cave-in in Canada had extinguished three lives because a similar letter had been ignored.

By the time the fifth letter had been received, the S.M.M.R. had received the information and had begun its investigation. As an *ex officio* organ of the United States Government, it had ways and means of getting hold of the originals of the letters which had been received by the responsible persons in each of the disasters. All had been sent by the same man; all had been typed on the same machine; all had been mailed in New York.

When the sixth warning had come to the offices of Caribbean Trans-Air, the S.M.M.R., working through the FBI, had persuaded the company's officials to take the regularly scheduled aircraft off the run and substitute another while the regular ship was carefully inspected. But it was the replacement ship that came to pieces in midair.

The anonymous predictor, whoever he was, was a man of no mean ability.

Then letter number seven had been received by the United States Department of Space. It predicted that a meteor would smash into America's Moonbase One, completely destroying it.

Finally, a non-anonymous letter had come to the S.M.M.R. requesting admission to the society, enclosing the proper fee. The letter also said that the writer was interested in literature on the subjects of prescience, precognition, and/or prophecy, and would be interested in contacting anyone who had had experience with such phenomena.

Putting two and two together only yields four, no matter how often it's done, but two to the eighth power gives a nice, round two hundred fifty-six, which is something one can sink one's teeth into.

Brian Taggert cut off the phone connection. "That's it, Mike," he said to the senator. "We've got him."

Two of the Society's agents, both top-flight telepaths, had gone out to "Dr. Joachim's" place on Coney Island's Boardwalk, posing as customers —"clients" was the word Dr. Joachim preferred—and had done a thorough probing job.

"He's what might be called a perfectly sincere fraud," Taggert contin-

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ued. "You know the type I'm sure."

The senator nodded silently. The woods were full of that kind of thing. Complete, reliable control of any any kind of psionic power requires understanding and sanity, but the ability lies dormant in many minds that cannot control it, and it can and does burst forth erratically at times. Finding a physical analogy for the phenomenon is difficult, since mental activities are, of necessity, of a higher order than physical activities.

Some of the operations of tensor calculus have analogs in algebra; many do not.

Taggert gestured with one hand. "He's been in business there for years. Evidently, he's been able to make a few accurate predictions now and then—enough to keep his reputation going. He's tried to increase the frequency, accuracy, and detail of his 'flashes' by studying up on the techniques used by other seers, and, as a result, he's managed to soak up enough mystic balderdash to fill a library.

"He embellishes every one of his predictions to his 'clients' with all kinds of hokum, and he's been doing it so long that he really isn't sure how much of any prediction is truth and how much is embroidery work.

"The boys are trying to get more information on him now, and they're going to do a little deep probing, if they can get him set up right; maybe they'll be able to trigger off another flash on that moon-hit—but I doubt it."

Senator Kerotski thumbed his chin morosely. "You're probably right. Apparently, once those hunches come to a precog, they get everything in a flash and then they can't get another thing—ever. I wish we could get our hands on one who was halfway along toward *the* point. We've got experts on psychokinetics, levitation, telepathy, clairvoyance, and what-have-you. But precognition we don't seem to be able to find."

"We've got one now," Brian Taggert reminded him.

The senator snorted. "Even assuming that we had any theory on precognition completely symbolized, and assuming that this Forsythe has the kind of mind that can be taught, do you think we could get it done in a month? Because that's all the time we have."

"He's our first case," Taggert admitted. We'll have to probe everything out of him and construct symbol-theory around what we get. I'll be surprised if we get anywhere at all in the first six months."

Senator Kerotski put his hand over his eyes. "I give up. First the Chinese Soviet kidnaps Dr. Ch'ien and we have to scramble like maniacs to get him back before they find out that he's building a space drive that will make the rocket totally obsolete. Then we have to find out what's causing the rash of accidents that is holding up Dr. Theodore Nordred's antigravity project. And now, just as everything is coming to a head in both departments, we find that a meteor is going to hit Moonbase One

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sometime between thirty and sixty days from now." He spread apart the middle and ring fingers of the hand that covered his eyes and looked at Taggert through one eye. "And now you tell me that the only man who can pinpoint that time more exactly for us is of no use whatever to us. If we knew when that meteor was due to arrive, we would be able to spot and deflect it in time. It must be of pretty good size if it's going to demolish the whole base."

"How do you know it's going to be a meteor?"

"You think the Soviets would try to bomb it? Don't be silly, Taggert," Kerotski said, grinning.

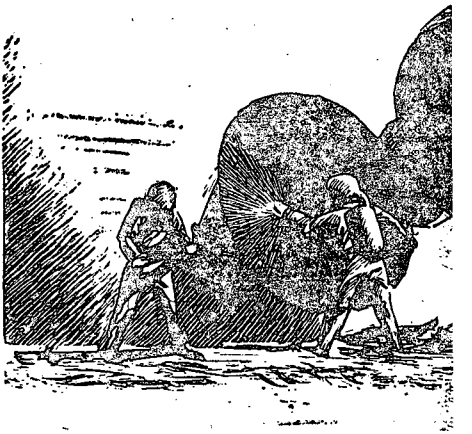
Taggert grinned back. "I'm not thinking they'd bomb us; but I'm trying to look at all the angles."

The worried look came back to the senator's pandalike face. "We have to do something. If only we *knew* that Forsythe's prediction will really come off. Or, if it will, then exactly *when?* And is there anything we can do about it, or will it be like the airline incident. If we hadn't made them switch planes, nothing would have happened. What if, no matter what we do, Moonbase One goes anyway?

"Remember, we haven't yet built Moonbase Two. If our only base on the moon is destroyed, the Soviets will have the whole moon to themselves. Have you any suggestions?"

"Sure," said Taggert. "Ask yourself one question: What is the purpose of Moonbase One?"

Slowly, a beatific smile spread itself over the senator's face.



The whole discussion had taken exactly ninety seconds.

"Mrs. Jesser," said Brian Taggert to the well-rounded, fortyish woman behind the reception desk at S.M.M.R. headquarters, "this is Dr. Forsythe. He has established a reputation as one of the finest seers living today."

Mrs. Jesser looked at the distinguished, white-bearded gentleman with an expression that was almost identical with the one her grandmother had worn when she met Rudolph Valentino, nearly sixty years before, and the one her mother had worn when she saw Frank Sinatra a generation later. It was not an uncommon expression for Mrs. Jesser's face to wear: it appeared every time

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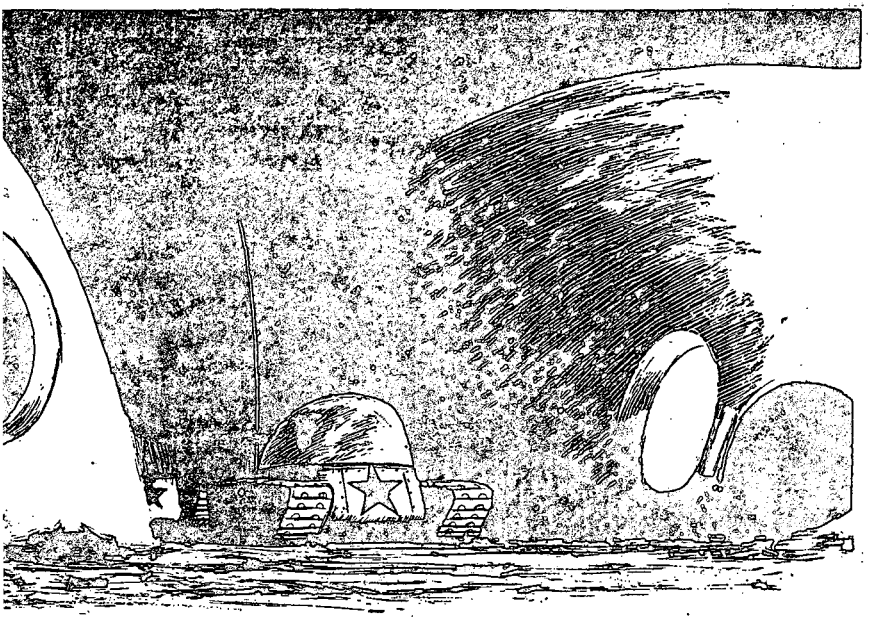

she was introduced to anyone who looked impressive and was touted as a great mystic of one kind or another.

"I'm *so* glad to *meet* you, Dr. Forsythe!" she burbled eagerly.

"Dr. Forsythe will be working for us for the next few months—his office will be Room B on the fourth floor," Taggert finished. He was genuinely fond of the woman, in spite of her mental dithers and schoolgirl mannerisms. Mysticism fascinated her, and she was firmly convinced that she had "just a *weenie* bit" of psychic power herself, although its exact nature seemed to change from time to time. But she did both her jobs well, although she was not aware of her double function. She thought she was being paid as a receptionist and phone operator, and she was quick and efficient about her work. She was also the perfect screen for the Society's real work, for if anyone ever suspected that the S.M.M.R. was not the group of crackpots that it appeared to be, five minutes talking with Mrs. Jesser would convince them otherwise.

"Oh, you're *staying* with us, Dr. Forsythe? How *won*derful! We simply *must* have a talk sometime!"

"Indeed we must, dear lady," said Forsythe. His voice and manner had just the right amount of benign dignity, with an almost indetectable touch of pompous condescending.

"Come along, doctor; I'll show you to your office." Taggert's face betrayed nothing of the enjoyment he was get-

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ting out of watching the mental gymnastics of the two. Forsythe and Mrs. Jesser were similar in some ways, but, of the two, Mrs. Jesser was actually the more honest. She only fooled herself; she never tried to fool anyone else. Forsythe, on the other hand, tried to put on a front for others, and, in doing so, had managed to delude himself pretty thoroughly.

Taggert's humor was not malicious; he was not laughing at them. He was admiring the skill of the human mind in tying itself in knots. When one watches a clever contortionist going through his paces, one doesn't laugh at the contortionist; one admires and enjoys the weird twists he can get himself into. And, like Taggert, one can only feel sympathy for one whose knots have become so devious and intricate that he can never extricate himself.

"Just follow me up the stairs," Taggert said. "I'll show you where your office is. Sorry we don't have an elevator, but this old building just wasn't built for it, and we've never had any real need for one."

"Perfectly all right," Forsythe said, following along behind.

Three weeks!

Taggert had to assume that the minimum time prediction was the accurate one. Damn! Why couldn't this last prediction have been as precise as the one about the air flight from Puerto Rico?

It had taken six days for the "accredited" agents of the S.M.M.R. to persuade "Dr. Peter Forsythe that he should leave his little place on the Boardwalk and come down to Arlington to work. It isn't easy to persuade a man to leave a business that he's built up over a long period of years, especially during the busy season. To leave the Boardwalk during the summer would, as far as Forsythe was concerned, be tantamount to economic suicide. He had to be offered, not only an income better than the one he was making, but better security as well. At fifty-four, one does not lightly throw over the work of a lifetime.

Still, he had plenty of safeguards. The rent was paid on his Boardwalk office, he had a guaranteed salary while he was working, and a "research bonus," designed to keep him working until the Society was finished with that phase of its work.

It's rather difficult for a man to resist the salesmanship of a telepath who knows exactly what his customer wants and, better, what he needs.

On the fourth floor, there were sounds of movement, the low staccato chatter of typers, occasional bits of conversation, and the hum of electronic equipment.

Forsythe was impressed, though not a line on his face showed it. The office to which he had been assigned was lined with electronic calculators, and his name had already been put on the door in gold. It was to his credit that he was impressed by the two factors in that order.

In the rear of the room, two technicians were working on an open panel in one of the units. Nearby, a

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dark-haired, dark-eyed, maturely handsome woman in her early thirties was holding a clip board and making occasional notes as the men worked. One of the men was using an electric drill, and the whine of metal on metal drowned out the slight noise that Taggert and Forsythe made as they entered. Only the woman was aware that they had come in, but she didn't betray the fact.

"Miss Tedesco?" Taggert called.

She looked up from her clip board, smiled, and walked toward the two newcomers. "Yes, Mr. Taggert?"

"'Bout done?"

"Almost. They're setting in the last component now."

Taggert nodded absently. "Miss Tedesco, this is Dr. Peter Forsythe, whom I told you about. Dr. Forsythe, this is Miss Donna Tedesco; she's the computer technician who will be working with you."

Miss Tedesco's smile was positively glittering. "I'm so pleased to meet you, doctor; I know our work together will be interesting."

"I trust it will," Forsythe said, beaming. Then a faint cloud seemed to come over his features. "I'm afraid I must confess a certain . . . er . . . lack of knowledge in the realm of computerdom. Mr. Taggert attempted to explain, but he, himself, has admitted that his knowledge of the details is . . . er . . . somewhat vague."

"I'm not a computerman, myself," Taggert said, smiling. "Miss Tedesco will be able to give you the details better than I can."

Miss Tedesco blinked. "You know the broad outline, surely? Of the project, I mean."

"Oh, yes; certainly," Forsythe said hurriedly. "We are attempting to determine whether the actions of human beings can actually have any effect on the outcome of the prophecy itself. In other words, if it is possible to avert, say, a disaster if it is foretold, or whether the very foretelling itself assures the ultimate outcome."

The woman nodded her agreement.

"As I understand it," Forsythe continued, "we are going to get several score clients—or, rather, *subjects*—and I am to . . . uh . . . exercise my talents, just as I have been doing for many years. The results are to be tabulated and run through the computers to see if there is any correlation between human activity taken as a result of the forecast and the actual foretold events themselves."

"That's right," said Miss Tedesco. She looked at Taggert. "That's what the committee outlined, in general, isn't it?"

"In general, yes," Taggert said.

"But what about the details?" Forsythe asked doggedly. "I mean, just how are we going to go about this? You must remember that I'm not at all familiar with . . . er . . . scientific research procedures."

"Oh, we'll work all that out together," said Miss Tedesco brightly. "You didn't think we'd plan a detailed work schedule without your co-operation, did you?"

"Well—" Forsythe said, swelling visibly with pride, "I suppose—"

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Taggert, glancing at his watch, interrupted. "I'll have to leave you two to work out your research schedule together. I have an appointment in a few minutes." He grasped Forsythe's hand and pumped it vigorously. "I believe we'll get along fine, Dr. Forsythe. And I believe our work here will be quite fruitful. Will you excuse me?"

"Certainly, Mr. Taggert. And I want to thank you for this opportunity to do research work along these lines."

Brian Taggart thanked Forsythe and hurried out with the air of a man with important and urgent things on his mind.

He went up the stairs to the office directly over the one he had assigned to Forsythe and stepped in quietly. Two men were relaxed in lounge chairs, their eyes closed.

Meshing? Taggert asked wordlessly.

Meshing.

Taggert closed the door carefully and went into his own office.

General Howard Layton, USSF, looked no different from any other Space Force officer, except that he was rather handsomer than most. He looked as though he might have posed for recruiting posters at one time, and, in point of fact, he had—back when he had been an ensign in the United States Navy's Submarine Service. He was forty-nine and looked a prematurely graying thirty.

He stood in the observation bunker at the landing area of St. Thomas Spacefield and watched through the periscope as a heavy rocket settled itself to the surface of the landing area. The blue-white tongue of flame touched the surface and splattered; then the heavy ship settled slowly down over it, as though it were sliding down a column of light. The column of light shortened—

And abruptly vanished as the ship touched down.

General Layton took his eyes away from the periscope. "Another one back safely. Thank God."

Nearby, the only other man in that room of the bunker, a rather short civilian, had been watching the same scene on a closed-circuit TV screen. He smiled up at the general. "How many loads does that make, so far?"

"Five. We'll have the job done before the deadline time."

"Were you worried?"

"A little. I still am, to be honest. What if nothing happens at the end of sixty days? The President isn't one of us, and he's only gone along with the Society's recommendations so far because we've been able to produce results. But"—he gestured outside, indicating the newly-landed ship—"all this extra expense isn't going to set well with him if we goof this once."

"I know," said the civilian. "But have you ever known Brian Taggert to be wrong?"

General Layton grinned. "No. And in a lesser man, that sort of omniscience could be infernally irritating. How is he progressing with Forsythe?"

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The civilian frowned. "We've got plenty of data so far, and the method seems to be working well, but we don't have enough to theorize yet.

"Forsythe just sits in his office and gives 'readings,' or whatever you want to call them, to the subjects who come in. *The Metaphysicist* has been running an ad asking for volunteers, so we have all kinds of people calling up for appointments. Forsythe is as happy as a kid."

"How about his predictions?"

"Donna Tedesco is running data processing on them. She's in constant mental contact with him. So are Hughes and Matsuo, in the office above. The three of them are meshed together with each other—don't ask me how; I'm no telepath—and they're getting a pretty good idea of what's going on in Forsythe's mind.

"Every once in a while, he gets a real flash of something, and it apparently comes pretty fast. The team is trying to analyze the fine-grain structure of the process now.

"The rest of the time, he simply gives out with the old guff that phony crystal-ball gazers have been giving out for centuries. Even when he gets a real flash, he piles on a lot of intuitive extrapolation. And the farther he gets from that central flash, the less reliable the predictions are."

"Do you think we'll get theory and symbology worked out before that meteor is supposed to hit Moonbase One?" asked the general.

The civilian shrugged. "Who knows? We'll have to take a lot on faith if we do, because there won't be enough time to check all his predictions. Each subject is being given a report sheet with his forecast on it, and he's supposed to check the accuracy of it as it happens. And our agents are making spot checks on them just to make sure. It'll take time. All we can do is hope."

"I suppose." General Layton took a quick look through the periscope again. The ship's air lock still hadn't opened; the air and ground were still too hot. He looked back at the civilian. "What about the espionage reports?"

The civilian tapped his briefcase. "I can give it to you in a capsule, verbally. You can look these over later."

"Shoot."

"The Soviets are getting worried, to put it bluntly. We can't hide those rockets, you know. Their own Luna-based radar has been picking up every one of them as they come in and leave. They're wondering why we're making so many trips all of a sudden."

"Have they done any theorizing?" the general asked worriedly.

"They have." The civilian chuckled sardonically. "They've decided we're trying for another Mars shot—a big one, this time."

The general exhaled sharply. "That's too close for comfort. How do they figure?"

"They figure we're amassing material at Moonbase One. They figure we intend to build the ship there, with the loads of stuff that we're sending up in the rockets."

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"What?" General Layton opened his mouth, then closed it. Then he began to laugh.

The civilian joined him.

Donna Tedesco pushed the papers across Brian Taggert's desk. "Check them yourself, Brian. I've gone over them six ways from Septuagesima, and I still can't see any other answer."

Taggert frowned at the papers and tapped them with a thoughtful finger, but he didn't pick them up. "I'll take your word for it, Donna. At least for right now. If we get completely balled up, we'll go over them together."

"If you ask me, we're already completely balled up."

"You think it's that bad?"

She looked at him pleadingly. "Can you think of any other explanation?"

"Not just yet," Brian Taggert admitted.

"Nor can I. There it is. Every single one of his valid predictions, every single one of his precognitive intuitions—*without exception*—has been based on the actions of human beings. He can predict stock market fluctuations, and family squabbles, and South American election results. His disaster predictions, every one of them, were due to *human* error, *human* failure—not Acts of God. He failed to predict the earthquake in Los Angeles; he missed the flood in the Yangtze Valley; he knew nothing of the eruption of Stromboli. All of these were disasters that took human lives in the past three weeks, and he missed every one of them. And yet, he managed to get nearly every major ship, airplane, and even automobile accident connected with his subjects.

"Seven of his subjects had relatives or friends who were hurt or killed in the earthquake-flood-eruption sequence, but he didn't see them. Yet he could pick up such small things as a nephew of one of the men getting a bad scald on his arm.

"In the face of that, how can we rely on his one prediction about a meteor striking Moonbase One?"

Taggert rubbed his forehead thoughtfully. "I don't know," he said slowly. "There must be a connection somehow."

"Oh, Brian, Brian!" Her eyes were glistening with as yet unshed tears. "I've never seen you go off on a wild tangent like this before! On the word of an old fraud like Forsythe, a man who lies about half the time, you talk the Administration into sinking hundreds of millions of dollars into the biggest space lift in history!

"Oh, sure; I know. The old fraud is convinced he was telling the truth. But were you tapping his mind when the prediction flash came? No! Was anyone? No! And he's perfectly capable of lying to himself, and you know it!

"And what will happen if it doesn't come off? We're past the first deadline already. If that meteor doesn't hit within the next twenty-eight days, the Society will be right back where it was ten years ago! Or worse!

"And all because you trusted the

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word of Mr. Phony-Doctor Forsythe!"

"Donna," Taggert said softly, "do you really think I'm that big a fool?" He handed her a handkerchief.

"N-no," she answered, wiping at her eyes. "Of c-course I don't. It's just that it makes me so d-darn *mad* to see everything go wrong like this."

"Nothing's gone wrong yet. I suggest you go take a good look at Forsythe's mind again and really try to understand the old boy. Maybe you'll get more of the fine-grain structure of it if you'll try for more understanding."

"What do you mean?" she asked, sniffing.

"Look. Forsythe has made his living being a fraud, right? And yet he sent out those warnings *free*—and anonymously. He had no thought of any reward or recompense, you know that. Why? Because he is basically a kind, decent human being. He wanted to do all he could to stop any injury or loss of life.

"Why, then, would he send out a fraudulent warning? He wouldn't. He didn't. Every one of those warnings—*including the last one*—was sent out because he *knew* that something was going to happen.

"Evidently, once he gets a flash about a certain event, he can't get any more data on that particular area of the future, or we could get more data on the Moonbase accident. I think, if we can boost his basic understanding up past the critical point, we'll have a man with controlled prescience, and we need that man.

"But, Donna, the only way we're ever going to do that—the only way we'll ever whip this problem—is for you to increase *your* understanding of *him*.

"You're past the critical point—'way past it—in *general* understanding. But you've got to keep an eye on the little specific instances, too."

She nodded contritely. "I know. I'm sorry. Sometimes a person can get too near a problem." She smiled. "Thanks for the new perspective, Brian. I'll go back to work and see if I can't look at it a little more clearly."

In the White House, Senator Mikhail Kerotski was facing two men—James Bandeau, the Secretary of Space, and the President of the United States.

"Mr. President," he said evenly, "I've known you for a long time. I haven't failed you yet."

"I know that, Mike," the President said smoothly. "Neither has your Society, as far as I know. It's still difficult for me to believe that they get their information the way you say they do, but you've never lied to me about anything so far, so I take your word for it. Your Society is the most efficient espionage and counterespionage group in history, as far as I know. But this is different."

"Damned right it's different!" snapped Secretary Bandeau. "Your own Society, senator, admits that we've stirred the Soviets up with this space lift thing. They've got ships of their own going out there now. Ac-

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cording to reports from Space Force intelligence, Chinese Moon cars have been prowling around Moonbase One, trying to find out what's going on."

"More than that," added the President, "they've sneaked a small group aboard the old *Lunik IX* to see what they can see from up there."

Secretary Bandeau jerked his head around to look at the President. "The old circumlunar satellite? Where did you hear that?"

The President smiled wanly. "From the S.M.M.R.'s report." He looked at Kerotski "I doubt that it will do them any good. I don't think they'll be able to see anything now."

"Not unless they've figured out some way to combine X rays with radar," the senator said. "And I'm quite sure they haven't."

"Senator," said the Secretary of Space, "a lot of money has been spent and a lot of risks have been taken, just on your say-so. I—"

"Now, just a minute, Jim," said the President flatly. "Let's not go off half-cocked. It wasn't done on Mike's say-so; it was done on mine. I signed the order because I believed it was the proper, if not the *only* thing to do." Then he looked at the senator. "But this is the last day, Mike. Nothing has happened.

"Now, I'm not blaming you. I didn't call you up here to do that. And I think we can quit worrying about explaining away the money angle. But we're going to have to explain *why* we did it, Mike. And I can't tell the truth."

"I'll say you can't!" Bandeau exploded. "That would look great, wouldn't it? I can see the headlines now: *'Fortuneteller Gave Me Advice,' President Says.* Brother!"

"Jim," the President said coldly, "I said to let me handle this."

"What you want, then, Mr. President," Kerotski put in smoothly, "is for me to help you concoct a good cover story."

"That's about it, Mike," the President admitted.

Kerotski shook his head slowly. "It won't be necessary."

Bandeau looked as though he were going to explode, but a glance from the President silenced him.

"Go on, Mike," he said to the senator.

"Mr. President, I know it looks bad. It's going to look even worse for a while. But, let me ask you one question. How is the Ch'ien space drive coming along?"

"Why . . . fine. It checked out months ago. The new ship is on her shakedown cruise now. You know that."

"Right. Now, ask yourself one more question: What is the purpose of Moonbase One?"

"Why, to—"

The telephone rang.

The President scooped it up with one hand. "Yes?"

Then he listened for a long minute, his expression changing slowly.

"Yes," he said at last. "Yes, I got it. No; I'll release it to the newsmen. All right. Fine." He hung up.

"Twelve minutes ago," he said

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slowly, "the old *Lunik IX* smashed into Moonbase One and blew it to smithereens. The Soviets say that a meteor hit *Lunik IX* at just the right angle to slow it down enough to make it hit the base. They send their condolences."

Brian Taggert lay back on the couch in his office and folded his hands complacently on his abdomen. "So Donna's theory held water and so did mine. The accident *was* due to human intervention. Forsythe saw something from space hitting Moonbase One and assumed it was a meteor. He never dreamed the Soviets would drop old *Lunik IX* on it."

Senator Kerotski carefully lit a cigar. "There's going to be an awful lot of fuss in the papers, but the President is going to announce that he accepts the Soviet story. I convinced him that it is best to let the Soviets think they're a long way ahead of us in the space race now. There's nothing like a little complacency to slow someone down."

"How'd you convince him?"

"Asked him the same question you asked me. Now that we have the Ch'ien space drive, what purpose does a moon base serve? None at all, of course."

Donna Tadesco leaned forward in her chair. "Did you happen to notice the sequence of events, senator? We were warned that the base would be struck. We decided to abandon it. We organized the biggest space lift in history to evacuate the men and the most valuable instruments. But the Soviets thought we were sending equipment *up* instead of bringing it *down*. They didn't know what we were up to, but they decided to put a stop to it, so they dropped an abandoned space satellite on it.

"If we hadn't decided to evacuate the base, it would never have happened.

"*That* is human intervention with a vengeance. We still don't know whether or not Forsythe's predictions will ever do us any good or not. Every time we've taken steps to avoid one of his prophesied catastrophes, we've done the very thing that brought them about."

The senator puffed his cigar in thoughtful silence.

"We'll just have to keep working with him," Taggert said. "Maybe we'll eventually make sense out of this precognition thing.

"At least we've got what we wanted. The Soviets think they've put us back ten years; they figure they've got more time, now, to get their own program a long ways ahead.

"When they do get to Mars and Venus and the planets of Alpha Centauri and Sirius and Procyon, they'll find us there, waiting for them."

Senator Kerotski chuckled softly. "You're a pretty good prophet, yourself, Brian. The only difference between you and Forsythe is that he's right half the time.

"You're right *all* the time."

"No," said Taggert. "Not all the time. Only when it's important."

THE END

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So the grammestors leaned on their spear-shafts and stared and muttered and gestured towards the tall chimney carrying off chlorine and other fumes. The poor wretches toiling on the corvee didn't even lift their eyes to stare.

For a long while Tad was simply too engrossed with his own work to notice, but finally, one day, his brief break coinciding with the work-force's midday pause, he took in the whole scene—ragged, sweat-reeking, gaunt men simply dropping to the ground wherever they happened to be. Tad had raised a rude sandwich of gray bread and cold meat to his mouth, and stopped, frozen by the look of stark envy on the faces of the work-people lying nearby.

"When do they eat, Grammestor?" he asked Robard.

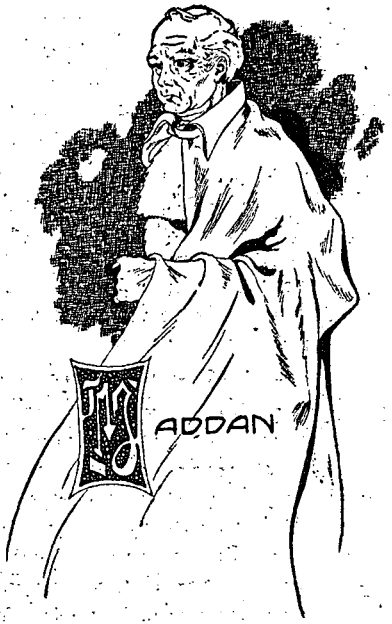
"Wha'?" Robard wolfed his own victuals, squinted at him. Tad repeated the question. Robard chewed painfully, swallowed. "They gets their eats at work-start," he said.

"What sort of eats?"

"Porridge-soup." And what was in it? Ground grain and hot water. What else? Each man had his own bowl. Was that all they got? No—at the late afternoon rest they were fed again. With what? "Porridge-soup."

Tad, half-angry, half-incredulous, began to insist that the rations had to be increased: meat, milk or cheese, fresh or dried fruit . . .

Robard, altogether incredulous, and as angry as his respect for Tad would allow, told him that he was dreaming. That not all the resources of Yarkrite could supply that sort of food to this many men. That the fact of Tad's being cossetted with "guest-feastings" should not give him the idea that everyone ate that well all the time. That the Island's foodstuffs were being severely taxed, as it was, and only the hope of being able to replenish their stores by trading a bit of the expected metal-from-Great-Grid to other islands had persuaded the grammestors to risk as much as they had.



So Tad's philanthropy died a-borning. The local soil, never exactly eager to respond to Earth-type husbandry, its surface thinly scratched with wooden plows, did not yield

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lavish harvests. A bad season could be disastrous. There being, at best, so little to save, the tendency was to eat everything but seed-corn—and, when "everything but" ran out, to go raiding for more. The bonding system, if strictly applied by a forceful High Grammestor, did tend to keep down raiding, and hence to maintain what feeble concepts of thrift existed. But no more.

Robard ended his talk with a ritual phrase. "'Is there no help for the widow's son?'" His gesture took in the Gridland and the workshop—laboratory. He lapsed into dialect. "There be's th' elp," he said.

Tad went back to work.

Building the production shed had been easy with the help of the workmen, but shortly after production had begun on the metals themselves, he found it necessary to get rid of them. He hated to arbitrarily dismiss the whole work force and send them home, but there was no help for it; they had a tendency to steal every piece of magnesium they could get their hands on. Finally, he was reduced to doing the work himself, with the aid of only one helper.

Robard's younger nephew, Edder, had been sentenced to three months in guard for his outburst at the initiation ceremony, which would have meant solitary confinement and a near-starvation diet. But he had been paroled to Tad instead, with the provision that he would work until the Grid was finished.

Now the partly-completed Grid was surrounded by a ring of well-armed soldiers whose duty it was to keep everyone else away from the Gridland, to prevent the pilfering of metal. And even they were not allowed to come within two hundred meters of the Gridland itself.

Tad was beginning to feel as though he'd been put to the torture. His muscles were aching from unwonted physical exertion, and his brain felt tired and sluggish, even after a good night's sleep.

At first, he had been tempted to convert his equipment to the manufacture of smaller beams after he had made enough of the large ones to construct a small grid—one just big enough to enable him to contact Sirius V with his communicator. But that would have meant converting back so that more large beams could be made, and then converting a third time to make the small ones again. So, much as he longed to hear "properly" used speech again, he decided to hold off until the Grid was finished.

Still, if it had only been the physical labor and the mental work of figuring tolerances and loads and energy flows, the job would have been a relatively simple one. But he had other things to worry about.

Edder, for example:

"Grammestor Tad, I be's works for ya faithful, eh?"

"Faithful" was not perhaps quite the word Tad would have chosen to describe Edder's performance of his appointed task. Now cringing, now fawning, now glowering, now glar-

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ing greedily, now pretending insouciance, Edder, with his cunning little eyes and long blue chin, was something less than the ideal Man Friday.

Still, why antagonize him? Tad gave a reluctant nod. "Yes, Edder."

Edder all but pounced. "Grammestor Nothek—" He named a nondescript chieftain whose land marched with Eftor's on the north. "Grammestor Nothek be's a cousin ta Old Mom, as was. E gots no heir, just a galchild." The young man's hands were trembling in front of Tad, as if Edder could hardly keep from taking hold of him, to impress him with the importance of what he was saying. "Now. Now. Worshipful, for fifteen, sixteen pigs a metal, old Nothek makes *me* ta be's heir, ya sees."

"Uh. well—"

"E be's old, old. Time he croaks, I be's Grammestor! I gives ya double-tithe for a tenyear, eh? Eh? Ya gives me fifteen pigs—"

Tad wanted to pacify the boy; Edder was the only one who had seen the power pack in operation, and he had been hungrily eying the silver busbars that led out of it to the graphite electrolysis vats. If word got out that so much metal was available, Tad wasn't sure what would happen.

"When the Grid starts working, you'll be able to get metal," he pointed out.

"Ye'. Ya says that a'ready. But I means the metal ya's makins *now*. If I be's waits till *all* Grammestors as metal, then it takes more pigs a metal for bonding. Thirty, fifty, maybe even seventy pigs," he said cannily.

"Edder, I've *told* you. I've *showed* you. You can't use this metal. It's too soft; it burns."

But it was obvious that Edder didn't believe him. Tad had held a big demonstration of the inflammability and softness of sodium; he'd made several pounds of it and then tossed it into the pond on the Gridland while a group of the Grammestors were gathered to watch. They had been impressed and startled by the resulting violence, and the flare of yellow flame had widened their eyes, but it hadn't made any impression on Edder except to give his face a knowing look.

The exhibition of the burning sodium was, in Edder's opinion, only a trick to mislead him. And, of course, it didn't mislead him at *all*. Metal didn't burn, and Edder knew it; no Old Worlder could fool *him* with a silly trick.

Old Robard was not above dropping a few hints, himself. He wanted to get his hands on the metal before Maddan did. Or at least before his arch-enemy, "Orse-son" Arnat, got any of it.

"Cans ya gives me just a few pigs, Grammestor Tad?" he wheedled. "As a loan, a course. I pays ya back as soon as Grid be's built an' metal comes in for all."

"Robard, I *can't* give you any. I've got to use it to build the Grid." He knew it was hopeless to tell Robard that the metal would be worthless for his purposes; he had already gotten the same knowing look that Edder

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had given him. So he tried another tack.

"Look, Robard; I can't go on making this metal forever. There's only so much available, and we need it to make the Grid." He didn't try to explain that his power pack would only function for a certain length of time; he knew the metal-hungry old Grammestor wouldn't understand that, either. "You've got to be patient. As soon as we get the Grid built, there'll be metal enough."

But it had little apparent effect. The trouble with these people was that they couldn't see beyond today. They wanted metal, and they wanted it *now,* not tomorrow or the day after. The idea of saving today's production output in order to have more for the future had almost never occurred to them. They had no concept of expanding an economy in order to provide necessities and luxuries for everyone, nor did they realize that savings must be enforced in order to expand.

They would not go without for a while in order to have plenty and more than plenty in the future.

Tad had to take all sorts of precautions to make sure his precious metal wasn't stolen while he slept. The magnesium ladders he and Edder used to climb the pillars were brought inside the "smithy" every night, and the building itself was carefully rigged with alarms to make sure no one broke in at night. He always locked Edder up each evening—not only for his own protection, but because he had been told to do so by Robard as a condition of the boy's parole.

Tad even had to keep the Grid charged at night with enough potential to knock out anyone who tried to touch it, and he'd already caught two of the soldiers that way, before they learned to keep their sticky fingers off the beams.

Then the day the two strangers came, riding so straightly toward the door of the "smithy" that Tad thought for a moment they meant to ride in, and moved to block their way.

If they were strangers to him, they were not to Edder. His face—he had been badgering Tad for a promise of metal again—which had been merely malevolent, now grew murderous.

"What's it *they* do's ere?" he muttered.

"Who are they?" Tad asked.

As Edder growled a string of curses, the two dismounted. The older man swaggered up to Tad. He was a red-faced, red-haired, bear of a man. Tad recognized him from description; it was Arnat. The other, a younger copy, must be his son and bonded heir, Jorg.

"Ya be's Grammestor Tad, eh? Some'at new on Yarkrite—a grammestor who gots no' a single man t' arms! Smith, ya be's, eh? Well."

He turned and surveyed the huge, silver-white beams that spanned the Grid columns in the near distance. When done, the Grid would present an almost solid surface.

"They tells me true, I sees, that ya

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makes metal. I thinks it a lie when I first ears it, but now I sees ya tells true." He turned back and looked at Tad, as if taking his measure. Arnat's eyes were a pale and empty blue.

"Ye'," said Jorg. "No' such metal on all Ogarth—na f'long time."

Edder, not even trying to conceal his hatred, demanded: "Robard knows ya be's ere?"

Arnat ignored him. He spat on the ground, faced Tad squarely, hands tucked into the belt which girded his huge waist. "How's it ya sends na word t' Arnat, then?" he demanded, his voice rising. "Gridland's common'eld. Ya thinks ta keep me fro' *my* share a the metal?" Tad saw Robard and Soby riding hell-for-leather over the hill, followed by Eftor, who was—so he said—visiting Robard on private business. So Tad held his peace and let Arnat rage.

And rage he did.

"Ya's hand in glove wi' Robard!" he howled. "Ow's it ya gots na care a Robard's due to us? Metal he owes an' pays not, due an' debts since 'is great-grandsir's time?"

Robard himself rode up in time to catch this, and it seemed to drive him half out of his mind. "Ya as na due!" he shouted. "Ya debt be's wiped out when ya great-grandsir takes away my seacoast land!" The ancient conflict seemed about to be fought anew.

"Seacoast land be's taked away in fair war!" Arnat shouted hoarsely. "It as nought ta do with due and debt. Ya owes us metal! We means ta gets it!"

Arnat, Robard, Soby, Edder, Jorg, and others—men-at-arms whose names Tad did not know—moved nearer to each other.

Then, abruptly, Eftor stood in the middle.

"Twice in this tenyear, Arnat," he said, "we gots ta double ya's bond, ya troubles the peace so. If we doubles it again, 'as you the metal?"

Arnat stopped his raging suddenly.

Eftor went on. "If we's makes ya bond forfeit, Arnat, what then? Ya thinks a this? Best ya goes off an thinks, so."

Arnat, huge head hanging sullenly, went, followed by Jorg. They seemed to be trying hard to think of that.

Tad said, "Thanks, Grammestor Eftor."

The white-bearded oldster nodded quickly. Then he said, "I brings this word fro' High Grammestor: We musts keeps a look-out for men fro' other islands. Maddan leaves no more catamarans goes out for off-island trade till Great Grid be done, less word spreads."

Tad thought that was all foolishness, and said so. An embargo was as good a way of spreading suspicion, of making other islands wonder what was going on, as anything devised for such an end. But Eftor told him, with a touch of sharpness in his voice, that Maddan—and, for that matter, all of them—knew the people of Hogarth better than any newcomer from Sirius V could. Even if Tad *was* making metal, he was not to presume too much on his rank.

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"An' be's one thing more, Grammestor Tad: Common folk be's tells they shall all gots metal, too, when Great Grid be's done. But this musts not ta be! Do's all gots metal, where be's power? Where be's grammestors?"

Weariness made Tad sag. He had no stomach for discussion, for explanation. He said, "I must go back to work now." As he turned and went to the lab, Eftor, Robard, Soby, and even Edder watched him go, silently; then they drew close, as men do who have heavy matters to talk about.

Within two more months, Tad was beginning to wonder just how long he would have to put up with the tension surrounding him. The grumbling had increased, and now it was coming from all quarters. The Grammestors of Yarkrite saw great quantities of their substance vanishing in the direction of the Gridplain in Robard's territory, and, so far, they had seen no returns. What sort of business was it, they asked, in which a man pays a great price and receives nothing in return?

That Tad could make metal, none doubted. *There* was what they were paying for! Why hadn't they been given their share? Was it possible that Robard and High Grammestor Maddan were simply going to share it between themselves, leaving the others, at most, only a small share?

Other rumors reached Tad's ears—mostly through the officers of the surrounding guard. It was said that all the Grammestors, including Maddan, feared that the men of the Islands of Skawtrite, nearly a thousand miles to the north, were preparing an invasion fleet of several thousand catamarans to invade Yarkrite and take the Gridmetal. It was also said that the operative smiths, the actual working priesthood of the culture, were talking against Tad and his new metal.

The number of men in the guard began to increase. Theoretically, the guard was under the direct control of High Grammestor Maddan; actually, since the various units were manned from the various Grammestors' own armies, their loyalty was divided. And each Grammestor was adding to the men in his own units, just in case.

One by one, the other Grammestors put in appearances on the scene. Hadn't they the right to see where their contributions were going? And wasn't it natural that they wanted to be on hand to see with their own eyes the long-awaited day when the Great Grid began its operations? As for bringing their smiths along with them—why, who was better fitted to see the fair distribution of the metal when it finally came, singing through the stars, to materialize on the reforming platform?

Tad just watched as each one pitched his skin tent with the others that dotted the hills surrounding the Gridplain, then he shrugged and went back to work. There were, he calculated, not more than three or four days work left, and everything faded from his mind but getting the

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work done. Then he could contact Sirius V and the Hegemonic Government, and throw the whole problem in *their* collective lap. He wasn't a sociologist; the question of maintaining a feudal oligarchy in power, or creating the conditions for social breakdown were over his head.

Way over it.

He worked feverishly, wanting only to get the task at hand finished. Very probably, the Government experts would know how to arrange things properly, to allow for slow and constructive change. And, anyway, no matter what happened, nothing could happen to Hogarth's that would be worse than what had happened to it during the past three hundred years. Surely it was time to force the retreat of barbarism and hunger.

The unfinished part of the Grid was in the northwest corner. Tad was busied there, sunburned and sweating. Many times he had been tempted to strip to the waist, but he didn't want to reveal the gun still holstered inside his jacket. Edder, stripped almost naked, worked sullenly under his direction. Somehow, the circle of guards had closed in during recent days, so that the Gridland was no longer shut off. Thousands of people milled around just beyond the line of soldiers. Only the Grid itself and the production shed were still kept clear by the spearmen. Old Maddan, the High Grammestor, sat watchfully, just below where Tad was working.

The weather turned chillier towards late morning. A light drizzle began to fall. Tad heard a sound, tiny but clear.

He whirled around.

The man who had made the sound was like any of the other operative smiths whose numbers had increased so much of late. His gloves and apron were not the ceremonial white lambskin ones of the Grammestors; they were worn and dirty from hard, constant usage. The man's hair was ragged, poorly cut. His clothes were not ragged, but they were worn and patched. In one hand he held the hammer he must have brought from his forge. And in the other was the piece of magnesium he had just broken from one of the ladders.

Tad scrambled down the ladder nearest to him and walked toward the man, not quite sure in his own mind what he intended to do or say. As he approached, the smith looked at him, his face at once greedy and shamed. Then he lifted up his head, raised his eyebrows, and thrust out his chin, bold and defiant. In a second, he was gone into the crowd. No spearman tried to stop the passage of a smith.

More annoyed than anything else, Tad turned to Maddan. "Look here, High Grammestor," he said, "that's got to be stopped at once."

Maddan looked into the thick-pressing crowd where the vandal had vanished; he looked up and around at the intricate metal-work of the Grid. Tad's words focused the old man's agate eyes upon him. Automatically, almost obediently, the High Grammestor said, "Got to be stopped—"

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Tad heard someone move behind him, turned, and found himself face-to-face with Robard. The red, puffy eyes peered at him dimly, then swung to the Grid, and the dry lips opened, the gray and swollen tongue parted from teeth with a soft, sticky sound.

Then, suddenly, the air was filled with the sound of shouts and scuffling and sharp blows. "Thieves! Thieves!" screamed a voice—Soby's? Edder's? "Arnat breaks is bond! Arnat! E steals the metal!"

And Arnat's hoarse, raw voice: "Stands back! I sha' gets my due! Robard, the orse-son—"

The crowd swayed, murmured, pressed in the retreating guards, who stared, openmouthed, over their shoulders. Robard's mouth opened—

"Robard! Maddan! Stop them!" Tad cried.

It was not so much a shout as a howl which broke from Robard then. Rage, desperation, eagerness. As Tad took a step forward, Robard's spear came swinging; the butt caught him below the breastbone, heavy and sickening. Tad doubled over and stumbled as Robard found words.

"Guards! Men! My smiths, my smiths! Half a everything! It be's our metal! Kills the bond-breakers! Our seacoast they steals—they musts not ta steals our metal, too!"

The light drizzle had become heavier, but no one heeded that. It

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seemed to Tad, fallen into the grass beneath the Grid, that this was somehow significant, but he was too sickened to think why. Anguished, he tried to rise. *Half of everything. What was "everything"?*

And the growl of the mob as it surged and receded—serfs, armed men, orse-riders, headmen, uncertain what to do, where to begin—one word rising thick and ugly. *"Metal!"*

Robard's voice: "Arnat gots no due ere! It be's paid is great-grandsir, time e steals our seacoast! E never gets no due, Arnat Orse-son! *Baghan!* A lie—our land—" And then, his voice a scream: *"Our metal! Our metal! Ours!"*

Other voices then: "Grid and Gridland be's common'eld! Eftor's men! Rallys ere ta me!"

"My smiths! Robard's smiths! Guards! Men a Robard! Ya gets half a everything f' yasames! Now! Now!"

Tad shouted through the pain-mist that filled his brain: *"No! Not in this rain! No! Nonononono . . ."* But the voice sounded childishly weak in his ears.

Do something! his mind shouted. *Stop them!*

He forced himself to one knee, fumbled in his jacket, and drew his gun. A voice at his ear cried: *"Metal!"* and the gun was twisted violently from his grasp.

His own thoughts poured like a torrent into Tad's mind. *This is failure . . . no Grid . . . no contact with civilization . . . they couldn't see, couldn't learn—* And something hit the side of his head, felling him.

"Metal!" the mob sang. *"Metal!"* With hammers, tongs, and shears; with stones, clubs, bare hands, with teeth, even, they swarmed over the Grid.

Wait! thought Tad. *Don't!* But his voice couldn't form the words.

And it happened. The rainwater poured into the hundreds of cuts where heavy tools had smashed through the thin magnesium cladding of the sodium busbars, and, almost simultaneously, hundreds of volcanoes of spewing, popping, roaring yellow flame covered the Grid. In the oxygen-rich air, the glaring flames spread rapidly and hotly, becoming blindingly white as the magnesium, too, took fire.

The sounds of the mob had changed in a fraction of a second, becoming screams of pain and terror. A white, alkali smoke made the air bitterly pungent and choking. Someone fell heavily on Tad, and he felt his leg bone snap.

Eftor's voice came, half astonished, half terrified: "It burns! Metal na burns, but *this* does!" And then he screamed.

Two men seized Tad and tugged at him. The pain in his broken leg seared like the fire overhead. He screamed, tried to struggle; but in a second or two they had carried him out from beneath the edge of the now-blazing Grid, and into the crowd of sometime onlookers who were now fleeing from the blue-white actinic glare of the flaming metal. Tad twisted his head to look at the Grid.

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The flames of burning hydrogen were dancing high over the Grid, but the platform itself was a white, blinding flare that was almost impossible to look at. The mob's scream was like that of a dying animal. Those who had climbed the Grid were trying to get to the ground, and those who still could were trying to get out from under it. Some of those on top made it to the edge, others fell through the holes that were burning and melting in the once-tight mesh. They screamed again while fiery gobbets of molten sodium dribbled and dropped around and over them.

Tad heard Robard cry out once more, his voice hoarse and agonized.

"Is there no help for the widow's son?"

The answer came in a rain of molten metal, which cut off his cry.

There was no help.

The rain was heavy—very heavy. The water poured onto Tad's face. A voice said: "Be's enough. Is eyes moves." The water stopped.

Tad blinked. A ring of faces looked down at him, solicitously. Maddan's was among them. Gentle hands assisted Tad as he struggled to sit up. His leg, he saw, was splinted. He was grateful for the wetness of his face; it concealed the tears he felt running.

There was still a white-and-yellow glare somewhere to the right, and he turned his head to look. Beyond the crest of a nearby hill, a column of white smoke and dancing, sodium-yellow hydrogen flame was lit from beneath by the bluish whiteness of burning magnesium.

"I've failed," Tad muttered. "Maddan, you were right. I thought I knew everything . . . I thought they'd know better . . . I thought they'd realize . . . I thought—"

"Orse-son, *baghan,* fools!" Maddan growled, watching the distant holocaust. "Robard, Nothek, Arnat, Eftor, Govin, Perless—" He looked down at Tad, his face troubled and grim. "All be's good men in they own ways, Tad —remember that." Then he looked again at the fire. "But they be's fools; they cans not ta learns.

"Smiths, too," he went on. "Dead because they be's fools."

He glanced around at the five men who stood with him. "Even my own men leaves me ta take metal. Five only who be's not fools."

"Metal fire be's hot," said one of the men, staring at the incandescent column with glassy eyes.

"Ye'," said another. "Be's roasts even men who fall outside Gridplain, if they cans not ta moves fast enough."

Tad closed his eyes and tried to blot out the picture that the man's words had brought to his mind. He had failed—failed horribly. He, a man from the civilized Old Worlds, a Technician *Beta*-Fourth, had failed because he had not listened to a . . . a witch-doctor . . . an unlettered barbarian.

He must have said something aloud, for Maddan's voice cut in: "Na, na, young worshipful. Ya faileds not. It *ads* t' appen so. Grammestors

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and smiths who dies be's dead fro' own greed. They as be's still alive, they be's alive because they be's not fools, but wise. Now I cans ta make new Grammestors, as is right and duty a High Grammestor." He chuckled without humor. "An' Grammestors who be's not dead be's forfeit bonds for breaking a peace. For a while, I be's in control a Grand Chapter; I cans ta make changes as has needs ta be made for a underdyear or more."

So that was it, Tad thought bitterly. *The old villain allowed the Grid to be burned to further his own political ambitions—to increase his power—*

But that didn't make sense, either, he realized suddenly. The High Grammestor couldn't have stopped the riot, even if he'd wanted to. And he certainly hadn't instigated it. Then what—?

"So you've got your power now," he said, watching Maddan's face carefully.

"Ye', ye', I gots it. An' I makes changes—changes ta elp Ogarth. But it be's power I cans not ta holds for long. Yarkrite be's but one island, an' I cans not ta elp other islands on Ogarth, not by mysames. I cans not ta makes other islands ta use metal ta fertilize land; I cans not ta stops all Ogarth from dying. Not without Great Grid."

He looked down at Tad, his wise old face smiling faintly. "Na, ya has not failed. Now we goes on ta build a Great Grid that sha' not burn."

Tad brushed his face with his sleeve. "But . . . how—?" He blinked his eyes, as if trying to get Maddan's face in perfect focus would reveal the thoughts that were in that enigmatic mind. "Is my . . . my power pack—"

Maddan shook his head. "Na, na. All that be's gone—ruined in fire. Ya's smithy burns there, too. But we needs 'em not."

"But I can't make sodium or magnesium without—

"Ya needs 'em not, I says," Maddan interrupted. "Now I has control a Grand Chapter, I has control a metal, too. There be's enough copper left ta build Grid, time ya shows us ow. Every pig a it comes out a treasure-oles when Maddan says. Too bad sa many gots ta die, but there be's a new life in sight, as the faith we kepts tolds tell. Metal for all, food for all, new lore for all. Three underdyears we lives like beasts, but that ends now.

"Tomorra, we starts ta works again."

Slowly, carefully, the men lifted Tad onto a litter. Maddan covered him with his own cloak.

He knew what would happen, Tad thought dazedly. *He knew he couldn't stop it; they wouldn't have let him. But he knew how to use the inevitable.*

The widow's son was going to help himself.

THE END

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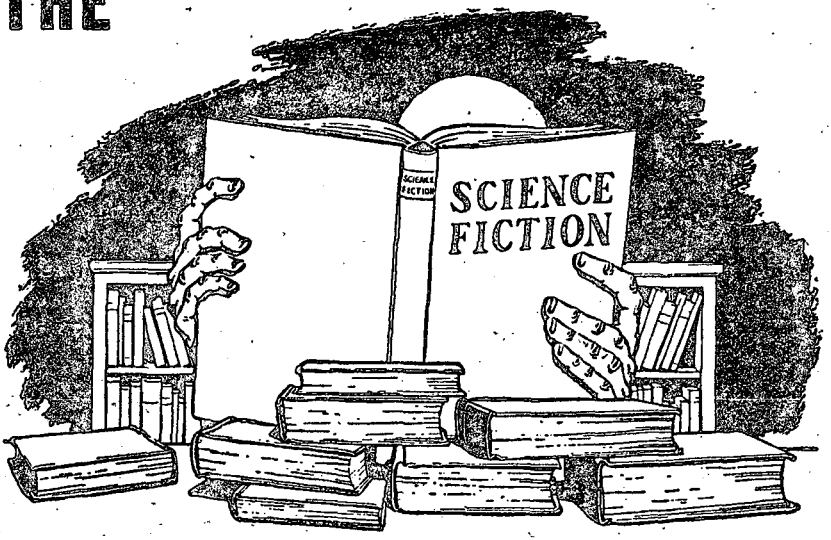

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By P. SCHUYLER MILLER

MULTIPLE STANDARDS

ANTHONY BOUCHER, one of the more knowing editors this field has had, opened his introduction to Damon Knight's "Far Out" with the statement:

"This book is not science fiction.

"I say this not because it is true, but because such a statement is today's approved method, among publishers and critics, of persuading people to read imaginative fiction."

There may be an exception: an author of distinction—scientific, literary, political, anything—may on occasion be allowed the whimsy of having his fiction called, jokingly, "science fiction." At that, it may hurt his sales . . .

The case at hand is a very thin book of fiction by Dr. Leo Szilard, the distinguished physicist, which Simon and Schuster published simul-

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taneously in hard covers, for $3.00, and as a paperback, for $1.00. Its name: "The Voice of the Dolphins." *Saturday Review,* in its April 29th issue, made it "Book of the Week" and gave it an almost full-page review, plus another page on the author. The publishers, in a New York *Times* advertisement, call the review "superb" and a "tribute"; they do *not* quote the first paragraph, which identifies the book as "a collection of science-fiction stories" but hastens to qualify: "written not by the usual pseudo-scientific journalist but by one of the leading physicists of our era." Their own identification, in the main head for the ad, is "A book of brilliant political and social satire, fantasy—and perhaps prophecy." All of these it is, except, perhaps, brilliant; we have seen better reasoning, sharper satire, and more accomplished and convincing fantasy in these pages, written by those "pseudoscientific journalists."

The note of sourness which you may have detected in the last couple of paragraphs is by no means directed at Dr. Szilard, who is both a scientist and a person of distinction, and who would probably get along very well in pro circles at a convention. My feeling is that he wrote the five stories in "The Voice of the Dolphins" partly for his own amusement, partly because he knows that science fiction offers rare opportunities for satirizing the *status quo,* extrapolating trends to monstrousness, and camouflaging serious ideas with—to quote Boucher on Knight again—"intelligence, wit, imagination and wonder."

So what's with "Voice"?

The title story is a long novelette which purports to be a narrative history of our era, written from a little way ahead. It begins in 1963, when a group of Russian and American scientists set up the so-called Vienna Institute—the Biological Research Institute in Vienna—for work on molecular biology. Instead, the members of the Institute begin to investigate the intelligence of dolphins, learn their language, and give them the role of a steering committee for Institute Research. From scientific achievement—notably a strain of algae that provides food for the starving peoples of the world and incidentally act as a contraceptive—the dolphins proceed to social and political discovery and advice. A helpful technique is developed for freezing the Cold War solid. A method is developed for immobilizing obstructionist politicians by the judicious application of cash and honor. Finally the efforts of the dolphins seem, in the late 1880s, to have brought about an era of government by intelligence. The story closes with the libelous suggestion that the Russian and American members of the Vienna Institute were putting words into their dolphins' mouths.

All this is done with a wry, deadpan, matter-of-factness that is perfectly true to the form of scholarly monologue it imitates. Dr. Szilard—who is leading a very active life in a New York hospital with a presuma-

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bly fatal case of cancer—reports the posthumous placing of his name on a small crater on the Russian side of the Moon. His theme is, simply, that if the people of the world won't use intelligence, then intelligence may have to use people. He presents, as the dolphins' accomplishments in our future, proposals that he advanced himself in articles, addresses, letters.

The second, very short story, is "My Trial as a War Criminal." It appeared first in the *University of Chicago Law Review* in 1949, and has become something of a legal classic. In it Russia has won War III by sprinkling New Jersey with a child-killing virus, and is trying Szilard, the other scientists of the Manhattan Project, and the political leaders of the defeated United States as war criminals for dropping the Hiroshima and Nagasaki bombs. The deadly legal gavotte with which the prosecutors trap their victims is ruthlessly fascinating, ended only by a logically ironic gimmick.

"The Mark Gable Foundation" is a frolic in which the narrator, intending to go into frozen sleep until 2260 A.D., is awakened after ninety years and given a quietly humorous glimpse of the strange society that has developed because of the unforeseen consequences of the long sleep. "Calling All Stars" is a pretty obvious scrap in which a cybernetic society finds evidence that there is life of another kind on Earth. That dates from 1949, and is the least of the book's conceits. Finally, "Report on 'Grand Central Terminal'" is a mildly amusing pastiche of scientific reasoning, in which an extraterrestrial expedition to a lifeless Earth tries to reason out the nature and customs of Man, starting with the coin-in-a-slot toilets in Grand Central Station, New York.

It's amusing, parts of it are very well done . . . and it's by a famous man. That makes it "brilliant."

On some of the same shelves is the long-awaited Doubleday hardcover edition of Zenna Henderson's stories about "the People," the gifted folk from a far planet, fleeing the destruction of their Home, some of whom crashed on Earth near the beginning of this century. One group has remained together, isolated to keep their difference from our kind hidden. Others have been scattered, misfits in their "normal" surroundings. There are a few hybrids with ordinary men.

In "Pilgrimage"—239 pp.; $3.50—the novelettes that appeared in *Fantasy and Science Fiction* between 1952 and 1959 have been given a not entirely satisfactory thread of continuity, as a would-be suicide attends a meeting of the People, prior to their leaving Earth to rejoin their kin among the stars, and hears a series of people "testify"—as a camp-meeting preacher might say. Read all together in this way, there is a sameness about the episodes that probably would not have occurred if the book had been written straight out as a novel.

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But, carping aside, here is a rich, warm probing into human strength and human frailty that says more, and says it more hopefully, than Dr. Szilard's quiet satire—yet a book that will get no critical attention, simply because it is "science fiction." Most of Miss Henderson's heroines are teachers in small schools of her native Southwest, and they show more about what good teaching is, and can be, and must be than all the treatises by reformers of American Education. The People have extraordinary psi powers—levitation, telepathy, teleportation, fire-making, healing, and more—but I have yet to hear one of the railers at "psi" complain of any of these psi-brimming stories.

Here is a good book about teaching, about the Southwest, about people, about being different—a book that states its message over and over, now in one voice, now in another. But it's science fiction. Who'll take it seriously?

Finally, we have a book—"Some of Your Blood," by Theodore Sturgeon; Ballantine No. 458K; 143 pp; 35¢—that negates almost everything I said last month about constant levels of complexity, and the see-saw balance of character and plot that leaves one undeveloped when the other is built up. This is probably the best thing Ted Sturgeon has done—and some of you won't consider it science fiction, though it shows how the scientific use of psychiatry and psycholoy can probe an ugly psychosis. Because it's a paperback by a "branded" science-fiction writer, no critic of stature, no intellectual, nobody who is anybody would be caught reading it.

Yet Sturgeon has outdone himself—and you all know that takes doing. He has built real characters, deftly and economically, in the tormented "George Smith," in the two psychiatrists who try to get at the nature and causes of Smith's aberration—even in the girl who briefly visits Smith's home in the southern mountains to fill in missing bits of evidence. He has woven a beautifully intricate plot with consummate craftsmanship, bringing out the concealed truth of George Smith's terrible plight by implication as much as by statement, by what is not said as much as by what is.

And he has a gimmick—one that certainly will be no secret to anyone who knows this field, and knows Sturgeon, and takes the title of the book as literally as it is intended. Here, at last, a solid, plausible psychological structure has been erected to account for the phenomenon of vampirism. You cannot help believe that "real" vampires must be tormented souls like "George Smith."

With even greater understanding of the individual who is locked outside normality than Zenna Henderson shows in her too-gentle stories of her People . . . with the compassion for difference that his readers know well . . . and with sheer professional skill as a writer that not many of today's "great" novelists can equal, Theodore Sturgeon shows how ridiculous the multiple standard of

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quality in fiction has become, when the playful "Voice of the Dolphins" is hailed, when "the warmth and genuine sentiment of "Pilgrimage" will get a condescending smile, and when "Some of Your Blood" won't even be read by most of the critics who set our literary goals.

* * * * *

Final Seacon bulletin: if you are within commuting distance of Detroit, and want to go to the 19th World Science Fiction Convention in Seattle, Labor Day week end, get in touch at once with Reva Smilay, Apt. 404, 3421 W. Chicago Street, Detroit 6, Michigan. The Detroit fans are chartering a DC-4—if they can fill it—which will take them from Detroit to Seattle and return for only $157.50. This seems unbelievable, but it's what they say. The plane will leave Detroit on August 31st and get back there September 5th. The Seacon hotel, the Hyatt House, is right at the Seattle air terminal, so there's no problem at that end.

To avoid the "no show" headache that drives the airlines nuts, there will be a deposit of $25.00 when you make your reservation. If the flight is cancelled, you get it back. If you change your mind at the last minute, you don't.

As for the Seacon itself, need I say again that Robert A. Heinlein is Guest of Honor and principal speaker . . . John W. Campbell is on the program . . . membership is $2 now, plus $1 more when you get there. Send it to P.O. Box 1365, Broadway Branch, Seattle 2, Washington. The dates are September 2nd, 3rd and 4th, so that the Detroit plane will get you there early enough to become acquainted with people, and brings you back before you are completely exhausted.

STAR HUNTER, by Andre Norton. **THE BEAST MASTER**, by Andre Norton. Ace Books, New York. No. D-509. 96 + 159 pp. 35¢

Ace plugs the reprint—abridged—of "Beast Master" with a long quote from one of my paeons of praise for Andre Norton, as one of the top practitioners of adventure science fiction now writing. I agree with every word of it, and not just because I said it here before. For creating strange worlds, stocking them with strange creatures, entangling pleasant people in intricate yet believable plots, Miss Norton has no real equal.

The shorter part of this Ace Double Novel, "Star Hunter," is new and has a rather more complicated plot than usual. A plot to pass a mentally conditioned youngster off as a lost heir to a galactic fortune, by having him "found" on a seemingly harmless planet where he has been planted, blows up in everyone's face. The world turns out to be anything but harmless, with a particularly nasty, particularly potent intelligence working behind the scenes, with a race of efficient humanoid "hounds" to hunt the human hunters, with a mysterious valley that has an even greater mys-

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tery at its center, with . . . but that's why you read this kind of book, to be dragged along by the plot.

Miss Norton tells me that she has never written a sequel to one of her science-fiction novels, except that in the "Time Traders" series the adventures occur within the same conceptual framework, and main characters of one book stand in the wings of the next. She invariably creates solid, tantalizing mysteries and leaves the solution wide open . . . and "Star Hunter" is the worst of the lot in this respect. If Jules Verne could write several sequels to "Swiss Family Robinson," to tie up loose ends, and if Sprague de Camp and Bjorn Nyberg have been able to go on adding to the misadventures of Conan the Cimmerian, then somebody, some day, is going to be able to make a lifetime career of chinking the open spaces in Andre Norton's universe of worlds. I just hope they do it as well as she, and that she makes 'em wait a long, long time to start.

INVADERS FROM THE INFINITE, by John W. Campbell, Jr. Gnome Press, Hicksville, New York. 1961. 189 pp. $3.00

It would be nice to report that this twenty-nine-year-old novel by our editor—third and last of the "Arcot, Wade and Morey" stories from the old *Amazing Stories*—is as good as it was when it first appeared in the Spring-Summer 1932 *Amazing Quarterly*. However, John Campbell was writing a very different, trail-blazing type of story very shortly thereafter, under the pen name "Don A. Stuart," and he would be the last to deny that the two types of story are universes apart.

This yarn was close to the peak of the "super physics" school of that era, which John and Dr. E. E. Smith carved out of a corner of the space-opera field. Skittering around the frontiers of physical and chemical theory, using something that was not quite scientific double-talk to explain the miracles that the heroes brought out of thin air almost by snapping their fingers, they nevertheless maintained a pace and created a spirit of excitement that typified the science fiction of their day. Their readers put the magazine down convinced that if scientists weren't such stupid clods, all these things would come to pass next Tuesday.

In this, utterly ruthless, utterly vicious villains from the other side of nowhere set out to exterminate all competition in our galaxy. A race of super-dogs come to Earth for help, and our trio of supermen gladly give it. They zip around the universe collecting allies and weapons, fighting skirmish after skirmish and battle after battle . . . travel in time as well as space . . . oppose irresistible forces with immovable screens . . . and, of course, win hands down. The firewords are terrific, and there's never time to get choosy about the logic. However, if John Campbell were to write the same kind of story today—as I am sure he could—it would be utterly different. As it is,

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"Invaders From the Infinite" should have stayed in 1932, except for us old characters who like to reconstruct the Age of Wonder.

TITAN'S DAUGHTER, by James Blish. Berkley Books, New York. 1961. No. G-507. 142 pp. 35¢

This rather short novel is expanded from "Beanstalk," which was first published in the Kendell F. Crossen anthology, "Future Tense," in 1952. It illustrates the author's thorough versatility, since—in foundation mechanism, at least—it is a "hard science" story, built around the biological fact of tetraploid giantism.

Beyond that, it is a standard story of the isolation of the different—giants versus "normal" men, with a hidden twist in that, too. A snake in the home camp murders the scientist who created the tetraploids, and frames the hero; the heroine, and a lovably bumbling pup, are somehow the key to the situation. The people are complex in motivation and reaction, in a way that science-fiction characters never used to be, but the gimmick and the action that grows out of it predominate. After all, James Blish isn't a writer who stands still for nine years. It's the new work that's coming that you should keep an eye open for . . .

TURN LEFT AT THURSDAY, by Frederik Pohl. Ballantine Books, New York. 1961. No. 476K. 159 pp. 35¢

Frederik Pohl seems to get practically everything he writes into book form in record time, and it can't all be top grade. This collection doesn't quite meet his own standards.

There are seven stories, all from *Galaxy* and *If*, and with a greater variety of theme than previous collections have shown, in that there are fewer social satire stories and more "straight" plot-with-gimmick yarns. Examples? "Mars By Moonlight"—in which the Mars of a penal colony turns out not to be Mars at all. "The Seven Deadly Virtues," with a contorted society on Venus but the main interest centered on how to keep our hero from the living death of ostracism. "The Martian in the Attic," an almost old-fashioned yarn about the tycoon who has one and the sharper who tries to profit by his knowledge of the fact. "I Plinglot, Who You?" with its extraterrestrial troublemaker doing his best to finagle the Earth into mass suicide.

"The Richest Man in Levittown," on the other hand, is both a plot-twist yarn and a neat dig at our own social values. "The Hated" offers a very original approach to the question of how many men should constitute the crew of a planetary ship—by showing one way of handling the aftermath. And "Third Offense" is an ironic bit about punishment by time-machine. "The Hated" was in "Fourth Galaxy Reader" with a credit to "Paul Flehr."

SONS OF THE WOLF, by Adam Lukens. Avalon Books, New York. 1961. 224 pp. $2.95

Adam Lukens, on the strength of

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his three books for Avalon—"The Sea People," "Conquest of Life" and this—is a very competent writer who just misses being first rank, perhaps because he doesn't write enough to develop his talents. He can make a trite theme—at least, an unoriginal one—fresh and real, without ever getting quite all he might out of it.

This time, and in a way utterly unlike what Theodore Sturgeon has done with the vampire theme in "Some of Your Blood," Lukens has rationalized werewolves. He never does really settle the question whether lycanthropy is supernatural or the result of a weird kind of symbiosis between men and an unseen life form. Instead, we are introduced matter-of-factly to a set of medieval werewolves, in bad trouble, who persuade a witch to immolate them in a set of furniture until further notice. They appear again in 2346, and are immediately in even more trouble in a bizarre future society, where far-outness has been pushed to the point where being a werewolf is quite ordinary.

It's enjoyable throughout, and just misses being very good. The key character of the Woman is thrown away, and several other opportunities seem to me to be missed. Even so, Adam Lukens is someone to be watched.

EPIDEMIC, by Frank G. Slaughter. Doubleday & Co., Garden City, N.Y. 1961. 286 pp. $3.95

So far as I know, Frank G. Slaughter has never written the proverbial historical novel about Lincoln's doctor's dog, but it is almost the only corner of history into which he hasn't probed fictionally with a surgeon's scalpel. Now he is taking on the future—1965—and consequently venturing into our territory.

Beyond this mild extrapolation, "Epidemic" is simply a fast-paced account of how New York City will handle an epidemic of plague, started accidentally and fanned by Communist saboteurs.

The tramp steamer *Sally Piersol,* bound in from West Africa, has dumped several plague-stricken crewmen overboard before it docks in New York. Its captain is a dying man when he goes ashore, and its rats are fat and sassy as they lope down the gangplank through the picket line of a dock strike. Soon *Pasteurella pestis,* the plague bacterium, is well established in several places.

The burden of the story, however, is carried by the staff of Manhattan Central Hospital, which happens to have one of the world's foremost immunologists on hand to spot and handle the first cases, and to draw up the lines of battle with which New York fights for its life.

There is a certain amount of melodrama, what with juvenile gangs hunting down derelicts at the urging of a hidden, but not quite invisible, Red "leader," but the real interest of the book is in its documentary account of how such an epidemic spreads and how it can be handled.

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HUNTERS OF SPACE, by Joseph E. Kelleam. Avalon Books, New York. 1961. 223 pp. $2.95

This is the second "Jack Odin" book that Avalon has picked up from *Amazing Stories,* and it is no better than the first although it ranges all over the galaxy as well as inside the Earth. Incidentally, the story is tied into a 1930 *Amazing Stories Quarterly* yarn, "Tani of Ekkis," by one "Aladra Septama," who may or may not be the present author behind a mask.

In "The Little Men," Dr. Jack Odin went down into caverns inside the Earth where dwarfed Nordics, the Neeblings, live as thralls to a batch of star-rovers, the Brons, whose once great science is rotting away in the dark. The villainous Grim Hagen has snatched Odin's gal Maya, outfitted the ancient starship, opened the gates that let the sea into the inner world, and taken off to rule the stars. In record time Our Guys build their own ship and take after him, and with slugging and weaseling the battle crawls across and around Space into a far corner of nowhere, where Grim Hagen gets his.

Even thirty years ago, when "Tani" left "Ekkis," this would have been ordinary.

STARFIRE, by Robert Buckner. Perma Books, N.Y. No. M-4185. 139 pp. 35¢

This was a two-part serial in the *Saturday Evening Post*—as "Moon Pilot"—and is a pretty fair example of the trivial stuff that a big, slick, "national" weekly thinks science fiction should be.

There's this bright-eyed young biologist on a rocket project, who is tricked into volunteering to be the first man in space. And there's this quaint but living doll who chases him all over the United States, with the FBI in hot pursuit, just to warn him that his trammis doesn't have enough frammises. She flips open locks, puts the whammy on G-men with the greatest of ease, but is a *nice* girl at heart.

For Jerry Lewis, I suppose: "Cinderfella Visits Another Small Planet."

THE LAST 14, by Tyrone C. Barr. Chariot Books, No. CB-50. 1960. 156 pp. 50¢

This is the second of the "sexy science fiction" paperbacks that I have seen from this publisher, who does not give his address anywhere on the book and is not listed—at least, under this name—in the directories of paperback publishers. I suppose he wants to avoid trouble with the censors by staying invisible. In this case, the slavering sector of his faithful followers will be disappointed. Tyrone C. Barr, hailed on the cover as "the new British Science Fiction discovery," pulls his sensationalism out of the standards of 1910 to 1920, not 1960.

Admittedly I don't know much about the stratification of British society, but if the science-fiction writers we all know—Arthur C. Clarke,

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Eric Frank Russell, John Wyndham, John Christopher, Brian Aldiss, E. C. Tubb—are representative, the sea-girt folk who move in scientific circles don't act and think too radically different from their Yankee and Rebel relatives over here. Not so with the world of Mr. Barr, which is so multi-layered that the crew of the first manned space station includes a cook, a stewardess, a secretary, and a nurse, plus one working feminine crew member. The male crew members are a little more plausibly selected: captain, first officer, navigator, communications officer, chief engineer, ship's doctor, electronics expert—but also a gunner and a chaplain. Any functional equality of the sexes is simply not thought of—even Lady Pamela keeps her place when the Men are talking.

The standard wheel-type space station—aptly if coyly named the Wheorld for "wheel-world"—is hoisted into orbit by a mixture of brute force and antigravity. It gets into a couple of impossible orbits, and the author seems to think that power is needed to keep it in any orbit. Anyway, a few minutes after takeoff the world commits suicide, splitting from pole to pole from the sheer force of the hydrogen bombing of every place there are people. Captain Dick Adams promptly confines the members of the crew to their—sexually segregated—quarters in the plush satellite for the next five years, and seems amazed that there should be muttering. I'm amazed that there isn't more—especially in a Chariot book. Some mutiny with the fervor of a panty raid, solved with a one-two clobbering, is almost all the excitement until the grub runs out and they have to land. This is done on a chunk of land elevated from the bottom of the Atlantic, where a dense jungle has grown and weird mutant animals appeared in quantity in the five years.

Now, at last, sex raises its classless head and begins to undermine the values of British Society. Almost at once mayhem by monster and outright murder distract the attention, though it is mentioned that there are Babies on the way. Finally there's a last-man-down kind of mystery, with detecting and alibis and all, and a least-suspicious but really nasty villain.

Ridiculous, I calls it. I haven't seen the Barr name in recent issues of *New Worlds,* the very healthy British SF magazine. If "Ted" Carnell hasn't discovered Mr. Barr yet, I'm content to let him stay undiscovered.

HERE THEY COME AGAIN

DIE NEUEN HERRSCHER, von L. Sprague de Camp und P. Schuyler Miller. Moewig-Verlag, München 2, Türkenstrasse 24, Germany.

You maybe expected me not to advertise the fact that "Genus Homo" is now out in a German paperback edition? This is one of the "Terra Utopische Romane Science Fiction" series—No. 40—and costs one deutschmark, which is currently a hair over a quarter American. I can't tell you where to get it, and my Ger-

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man isn't good enough to tell yet whether they've put the giant rocketship, futuristic architecture, and blue people into our simple tale of a million years hence in the hinterland of Pittsburgh. The title seems to mean "The New Rulers," which isn't too bad.

THE CIRCUS OF DR. LAO, by Charles G. Finney. Compass Books No. C-82. 1961. 160 pp. $1.25

This has no real business here either, except that it is a really *classic* fantasy and you may not know that it's out in a paperback, with the inimitable Artzybasheff illustrations. Nothing really happens, except that a very queer circus comes to an Arizona small town.

WHEN THE KISSING HAD TO STOP, by Constantine Fitzgibbon. Bantam Books No. F-2255. 1961. 230 pp. 50¢

Last year's novel about the way England will let itself be outfoxed and swallowed up by Russia, some time in the near future.

UNDER THE INFLUENCE, by Geoffrey Kerr. Berkley Books No. G-518. 1961. 189 pp. 35¢

A broad comedy about the man who could read minds—when he was drunk.

DRUNKARD'S WALK, by Frederik Pohl. Gnome Press, Hicksville, N.Y. 1961. 160 pp. $2.75

Here's another anomaly, like the recent hardback publication of Vonnegut's "Sirens of Titan" after the paperback. Marty Greenberg of Gnome figured Pohl's novel is good enough for hard covers. He's right.

20,000 LEAGUES UNDER THE SEA, by Jules Verne. Associated Booksellers, Westport, Conn. 1960. 192 pp. $3.00

The new British "Fitzroy" edition of Verne's works . . . abridged.

MESSIAH, by Gore Vidal. Ballantine Books No. 484K. 1961. 202 pp. 35¢

Here's a mainstream author who doesn't object to having his story about the way a religious dictator took over America labeled science fiction. That's what it is—and good grade.

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TACKS

Dear Mr. Campbell:

G. Harry Stine's Science Fact comments in the May issue of ASF prompted this letter which might be called *"Super Science Fiction* as applied to the search for other races in the universe." Let us assume that there are a few races in the universe —I mean that universe, not just in our galaxy—who have reached the asymptote in their scientific progress trend curves a few of many years ago.

What conclusions can be drawn from this? Possibly the speed of light limitation does hold always and forever since with true instantaneous transportation it is entirely possible that all detected habitable planets would have been visited by this "asymptotic race." However, the control of energy curve probably does hold true, so let us ask ourselves how would a race with infinite—almost—energy capabilities attempt to communicate with the rest of the universe?

I Amplitude modulation of the output of a large thermonuclear, reactor in orbit might be visible for several light-years if a large part of the light output were in the visible part of the spectrum.

II Amplitude modulation or "polarization modulation" of the output of a star might be possible with enough energy put into some kind of field affecting the "atmosphere" of a star.

III The same effect applied to a Super Nova—purposely created —could carry modulated light information between galaxies.

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IV Whole clouds of interstellar gas might be excited in "Laser" like emission.

V Due possibly to magnetic field oscillations in a member of a binary star group enough force could be generated to rapidly vary the positions of a binary pair and cause light, gravity wave, or even nutrino variations.

VI By similar induced magnetic star variations possibly jets of particles could be shot out in a modulated fashion . . . i.e. information modulated on "cosmic rays"

VII Several million mile jets of heavily ionized material could be shot out from a planet and very low frequency radio waves —from ordinary alternators possibly—could be beamed using these jets as antenna array conductors. Phase modulation could be induced by swinging the jets around or switching very rapidly from one to the other.

VIII Interesting question, does the attraction of a particle whose mass has been increased—as an electron in a synchrotron—increase toward other particles. If so, our "asymptotic race" could create an indefinitely strong material and make a torsion pendulum out of it. The mass and restoring force and initial energy should be set up so that the maximum rim velocity will approach light speed, thus rapidly increasing and decreasing the mass of the bob and again creating fine gravity waves.

Anyway here are a number of communication systems which have one drawback and many advantages. The drawback is just that no race may want to transmit since sitting around and waiting for the answer would become very boring.

Great advantages are that the systems are inherently very high powered, very broad band, and in some of the cases omni-directional. Sounds almost as easy to detect as an old spark transmitter from a distance of ten feet. (Light, heat, noise, smell, also radio waves)

So why don't we start looking at suspicious stars lights novas et cetera?—Peter Lefferts, R.F. #2, Cherry Valley Road, Princeton, New Jersey.

If I were able to do that, I wouldn't. The techniques can signal across Kelopersecs all right—but . . . I should live so long! Even Andromeda is two megayears away!

Bet they're signaling in some way we've not yet discovered that gets there fast!

Dear Mr. Campbell:

Every five or ten years I write you a letter composed of two elements: (1) trigger, (2) top rating for your editorials. None yet published or answered. Surely it's not against your principles to acknowledge they're good? Well . . .

1) Trigger: G. Harry Stine's arti-

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cle in May on science-fiction's conservatism. Seems to me he overlooked one of the most interesting trend curves. My daughter has grown from 20 inches at birth to 63 inches in 15 years. At this rate of about 3 inches/yr. at 75 she will be 20 feet tall. And seemingly with still several years of life expectancy left, except that as most of her contemporaries have similar trend curves, this expectancy may be lowered by lack of room for them.

2) Editorials: still top rating.—Rand Gaaderdend, Reno, Nevada.

And she probably tripled her weight in the first year, so at 15 she weighs 3^{15} times as much, or roughly 14,300,000 pounds—provided you don't know how to construct trend curves.

Dear Mr. Campbell:

Thanks for the note, but I am too poor and too ignorant of electronics to build the Hieronymus machine. I am writing, though, because you may get a kick out of what happened to me.

I decided to use the pipe locators and do everything I could with them, recording the results in as scientific a manner as my personality would allow. The project was of course, laughed at from the start by everyone that saw me and my assistants out on the campus at lunch time, or during physics class, wandering around with the locators extended in front of us, and we were also on the end of many requests to find water, gold, uranium, and lost articles. This didn't bother me, though because I had expected such and was mentally prepared for it. It did help to make for a paucity of helpers in making test runs.

Though you certainly must know these things, here are a few of the conclusions I made when I was finished with the series of tests: They work. They shouldn't, but they do. You grow more sensitive to their use the more you work with them. They work for anybody who has faith in them—one boy tried a very simple test, mentally taking a negative attitude, and got nowhere. They work regardless of whether or not the pipes are metal, concrete, water-filled or empty. We probed for contacts, and even checked through a sewer main once to affirm the direction of the pipe. Electrical current apparently does nothing to them . . .

Anyway, the Science Fair date came. I was assigned one of the center tables, right up at the front of the lab, and was surrounded by idiot lights, buzzing tubes, humming amplifiers, exhibits of electrets, gravity attraction, nerve stimulus, and the usual—including an eight hundred dollar rocket. And there I was—two little pieces of wire, and a twenty-page booklet of facts and conclusions. I managed to attract quite a crowd, though, and soon was giving blindfolded demonstrations, by having the subjects walk over a pipe I figured to be in the center of the room, running under the row of desks. Nearly everyone got a contact over the spot,

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and some went away convinced—especially when some were successful with blindfolds. But then came the judges. I began: "Gentlemen, I have here a project which I believe to be of more potential value than all the idiot lights and amplifiers in this room, for I have not just re-done an old experiment, I have taken a device which, by all known laws, should not work, and I have proven that it does work. Call it magic if you will, but in this booklet I have proof for these statements."

I lost them on the word: "magic if you will . . ."

My physics teacher told me that during the show a professor from some university had come up to him and demanded that I be kicked out of the fair, for having a project that was unscientific and not at all showy. He ranted that my project should never have been allowed to enter, and on and on in that vein. My physics teacher laid him out with a few remarks, and the crowd ended up by giving me a round of applause—the only such tribute to be given that night.

I didn't even get a semi-honorable mention though.

This backs up a lot of what you've said in print so often, and I thought you'd find it interesting.—Bill Trotter, Charlotte, North Carolina.

If what Science can't explain is not fit for study—what is Science?

Dear John:

I was particularly interested in the dilemma of Chesty Hero as outlined in your January editorial. Forgetting for the moment the bit where you equated sixteen light-years with half a parsec, you brought out some interesting facts.

Here at Mount Stromlo we have just recently had a little fun with one of the problems most writers take for granted—finding the nearest (?) known star. Being in Southern Australia, unlike most of your readers, we are familiar with both Alpha and Beta Centauri, but we know there's another one called Proxima. Well, O.K., it's physically part of the Alpha Centauri system, but you didn't mention it. Now I said we wanted to find this star—maybe you are thinking it wasn't lost? Let me assure you that as far as we were concerned it was!

It was like this. The radioastronomers in Sydney wanted to turn some of their instruments on Proxima. Fair enough, sounds like a good idea. But they wanted to know its exact position in the sky, and asked us to supply it. Well, O.K. we are old-type astronomers, so we set about supplying them with the right co-ordinates and a finding chart. Now Proxima was discovered a while ago and its position is listed in catalogues. But there are things like precession and nutation that shift stars from their old catalogue positions, not to mention proper motion. So we took a Schmidt plate of the area. Ever see a good Schmidt plate? It's been stated—and it's true—that there exists at present no known way to ex-

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tract all the available information from a Schmidt plate—the reason being just too many thousands of star images. One of those tiny spots on the big blown-up negative print we made was Proxima—but which?

Well, we found it in the end, but it took some calculations and some work with a measuring engine, because the image was by no means distinctive. And this is the nearest known star! (?) Now we see what poor Chesty may be up against. It took us lots of equipment and work —so I refer you to your own final paragraph!

However, I am not so pessimistic about the basic problem as you might think. I think you might as well forget stars and constellations as your starting point. In this I agree with you. I'd start off with the three most conspicuous things, first—the galactic plane, which is elementary, and then the Magellanic Clouds, which are more conspicuous than you northerners think. This gives you your Galactic north and south. You know which way up you are. (Incidentally, we use the letters LMC for Large Magellanic Cloud, so NEVER write Lesser Magellanic Cloud as you did in the April editorial.) Next step is to get a few lines and angles, and here there are more natural signposts. The Orion nebula can be seen for a mighty long way, and has distinctive features. So has the great southern nebula of Eta Carina. Then there are the naked-eye star clusters—globular ones, I mean. We have two beauties down here—Omega Centauri and 47 Tucanae. Then there is something else you didn't think of. Radio sources. The Crab Nebula is biggest and best and should be easy to find. Then there is Cygnus A, also quite unmistakable with the right equipment, and Centaurus A. The first of these is in our galaxy, not far away, the others are well outside, in fact Cygnus A is about the nearest to infinity you can get. I feel sure that these easily identified (easily, that is for an f-t-l explorer—cosmonaut?!—who has been properly trained in astronomy) sources of radiation can, with decent measuring equipment, give quite a good position for 3-D navigation.

By the way, I'm pretty hopeless on constellations myself, but I do think I could recognize the Great Dipper. Still, for space navigation, it wouldn't matter if one knew only half the sky—because you can always see both halves. So cheer up, you northern-hemisphere people—when you get into space you'll see our vastly superior southern sky without having to travel to Australia!—M. J. Miller, Mount Stromlo Observatory, Canberra, A.C.T., Australia.

"Point out the nearest star." Easy, huh?

★ ★ ★ ★ ★

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Continued from page 7

stupendous energy of that landing jet would volatilize solid rock faster than the ship settled into the hole it blasted. It would be like trying to bring an oxy-hydrogen blowtorch in for a soft landing on a cake of Dry Ice.

Of course, there are a few other problems that we, back in the '30s, didn't know about or consider. There's definitely weather out there between the planets—radiation-density weather. A major solar flare can do a job of blasting the solar system with a mess of high-intensity, high-lethality radiation. Meteors aren't quite such a menace as they were once considered—but the high-energy particle radiation is many orders of magnitude worse than we thought. Shielding against it isn't going to be optional; it'll be essential.

Incidentally, this isn't an argument for instruments-only probes; not even lifeless instruments are immune to the effects of the sort of blast a really hot solar flare can kick out. It ionizes organic and inorganic materials, produces quantities of free radicles which promptly interact, and can turn the finest lubricating oil into a low-grade adhesive. The fluorocarbons are almost totally inert to chemical attack—but when ionized by bombardment, the fluorine ions can be positively guaranteed to find *some* new partner, and not necessarily the ones you want them to. Even instrument-only jobs would require shielding. The Van Allen radiation

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belts were first detected because the radiation detection instruments conked out completely under the violence of the radiation; special shielded detectors had to be sent up to get readings.

It was the dynamics of weather that licked the giant airship; a lighter-than-air craft has to be designed with an extremely slim margin of strength because weight is so crucially important.

So with the giant rocketship. Nuclear power won't help, actually, because of the reaction-mass-vs-jet-energy problem.

The giant rocketship is—we now know because of actual experience with rocketships—a science fantasy. Properly, future science-fiction stories should abandon the rocketship as a vehicle for space travel, as they have abandoned the giant airship for air travel. Successful space travel—commercial interplanetary travel—can *not* be achieved by rockets. It can be *done,* just as intercontinental flights with giant airships was done. But it can't be made commercially, economically usable.

There's the old saying, "Practice makes perfect!" It's completely false . . . if you're practicing doing it the wrong way. No matter how far you go east, you won't get to the north.

Successful commercial space flight will come only through the development of some form of true space drive—and this is *not* an argument for the Dean drive. It's simply a statement that something other than rockets must be achieved before we have true interplanetary travel. The Dean drive may or may not be it—but it is now abundantly clear that any story of interplanetary commercial rocketships is science fantasy, not science fiction.

We may do it by antigravity, which would allow the use of low-energy rocket drive. We may do it by radio transmission of matter, or teleportation, or by hyperspace.

But it won't be by the type of rocketship we've been thinking about for the last thirty years.

They, like hot-air balloons in the history of flight, have a tremendously valuable place, a very necessary place . . . but the place is not commercial long-range travel. But until the actual, practical experience of working with the beasts was in, we didn't have the data necessary to distinguish that as fantasy.

Now, however, we have.

We don't, yet, have a space drive in service; the fact that heavier-than-air craft were already in service was not necessary to demonstrate that the giant airship was not practicable. Had no airplanes been available before 1960, say, still the dirigible would not have been commercially usable. It wasn't a case of losing out to the competition of the airplane; it lost out to the forces of the weather. The failure was inherent, not relative.

The failure of the rocket is, equally, implicit in its operation, not merely relative to some other—and not yet in use—device.

The Editor.

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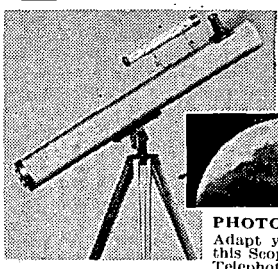

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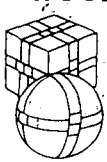

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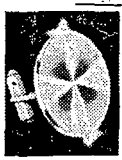

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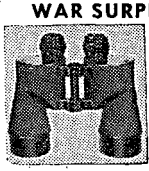

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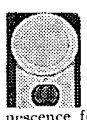

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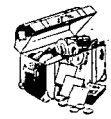

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